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Studies on formulation and standardization of spine gourd (*Momordica dioica* Roxb.) Pickle

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Abstract
In study preparation of Spine Gourd (*Momordica dioica Roxb)* Pickle was successfully done with its evaluation, formulation, standardization, proximate analysis and storage study. In that used ingredient Spine Guard contain high amounts of protein, calcium, phosphorous, iron, and highest amount of carotene amongst the cucurbitaceous vegetables. For the preparation of Spine Gourd (*Momordica dioica Roxb)* Pickle three trials were taken among the three trials, T2 get highest score on the basis of sensory evaluation. For preparation chopped Spine Guard and all spices were mixed with different variation then frying in pan with addition of oil and salt. Then cool it and vinegar were added. The pickle sample were analyzed for different parameter vis, pH value (4.47±0.02), Moisture content (83.4±0.03%), TS (16.4±0.09%), Acidity (0.795±0.07%), Ash content (4.01±0.08%), protein content (2.24±0.10%), fat content (6.57±0.02%), carbohydrate (48.30±0.09%) and the energy value is (469.92Kcal). The Spine Gourd (*Momordica dioica Roxb)* Pickle was rich in Protein, carbohydrate and other micronutrients which gives best energy source. Spine Gourd (*Momordica dioica Roxb)* Pickle stored in Glass bottles at room temperature for the period of six months. Spine Gourd (*Momordica dioica Roxb)* Pickle can be satisfy the consumer acceptance and quality.

Keywords: Spine Gourd (*Momordica dioica Roxb)*, Formulation, sensory evaluation, proximate analysis, Storage, Glass bottles etc.

Introduction

The preservation of food in common salt or vinegar is known as pickling. It is one of the most ancient method of preserving fruit and vegetable fruits and vegetables. Pickles are good appetizers and add to the palatability of a meal. They simulate the flow of gastric juice and thus help in a digestion. Several kinds of pickles are sold in the Indian market. Mango pickle ranks first followed by cauliflower, onion, turnip and lime pickles these are commonly made in homes as well as commercially manufactured and exported. Fruits are generally preserved in sweeten and spiced vinegar, while vegetable are preserved in salt (Fruits and Vegetable Preservation, Srivastava and Kumar, 2002) [13].

Pickle serve as appetizers and help in digestion by aiding flow of gastric juice. The process of food preservation in common salt or in vinegar or in both is called pickling. Pickling with the help of vinegar and oils has been in practice from time immemorial in this country. In modern days, pickles of different fruits and vegetables are prepared with the mixture of salt, oil, vinegar and spices etc. In pickles, oil acts as preservative (*Shahjahan et. al., 2005*).

Pickles are generally of three types namely pickles in vinegar, citrus juice, brine and oil. The presence of these ingredients, makes the product highly acidic in nature. A good packaging material for pickle can prevent spoilage. A good package for pickles should have the attributes such as aroma retention, excellent protection against light, moisture and oxygen, excellent integrity for containment, grease, oil and acid resistance, good aesthetics and appearance (Nirmala yenagi *et. al.,* 2010).

Spine gourd (*Momordica dioica* Roxb.) is a perennial climber of family Cucurbitaceae. This medicinally important and nutritionally rich vegetable is known by different names in local dialects like kankoda, meetha karela, kakrol, kartoli, kantola, bhatkarela, kaksa, ban karola etc. in different parts of India. Though spine gourd is closely related to bitter gourd, it is not as much popular as bitter gourd largely due to lack of awareness among consumers. The tuberous vegetable is mainly cultivated in West Bengal, Gujarat, Madhya Pradesh, Maharashtra and Karnataka. Besides, this vegetable grows naturally in the forest areas of Chhattisgarh, Jharkhand and Odisha where it is regularly consumed by the native tribals (Jitendra Kumar Tiwari et. al, 2022).

Spine gourd fruit is shortly beaked, densely echinate with soft spines, green in colour which becomes yellow at maturity. This climbing creeper is also found in Pakistan, Bangladesh and Ceylon. The fruits contain high amounts of protein, calcium, phosphorous, iron, and highest amount of carotene amongst the cucurbitaceous vegetables. This vegetable has high demand in localized markets but remain underutilized and under-exploited firstly due to its vegetative mode of propagation and secondly because of its dioecious nature. Spine gourd, owing to its proven nutritional and medicinal value, high keeping quality, ability to withstand long distance transportation and high market price, has potential to become major vegetable commodity like bitter gourd, and increase the farmer's income considerably. The farmers need to be sensitized about the scientific cultivation of spine gourd by adopting improved cultivation practices including maintenance of desired male: female ratio in the field to ensure maximum fruit set and use of quality planting materials of improved, notified varieties (Jitendra Kumar Tiwari *et al*, 2022).

The Spine gourd (*Momordica dioca* Roxb.**)** is a perennial, dioecious, cucurbitaceous climbing creeper and is known by various names such as Teasle gourd, Kantola /Kakrol Meetha Karela, Khekhsa, Padora, Bhaat Karela. It is cultivated for its fruits, which is used as a vegetable has a high demand in the market because of nutritional,

therapeutic value, long shelf-life, suitable for long-distance transportation. *M. dioca* is more closely relate to *Momordica charantia* (bitter gourd) though there are disagreements about the shape, size and taste. It is a perennial climber, dioecious in nature having tuberous roots. It is widely distributed in tropical and sub-tropical regions of India (Basumatary *et al*., 2014) [11], widely cultivated in Maharashtra, Gujarat, West Bengal, Madhya Pradesh and Karnataka. Kantola grows wild in Jharkhand, Chattisgarh, and Odisha. Immature, tender, small, spiny green fruits are used as vegetables (Janani Ponnusamy and Balusamy Arumugam, 2018) [4].

Generally pickles are prepared form raw mango. Pickles are a traditional product, with increasing awareness of the food value and dietary role of various food constituents. Pickle is an edible product preserved in common salt, vinegar and spices. But we used a Spine Gourd (*Momordica dioica Roxb)* for formulation of Spine Gourd (*Momordica dioica Roxb)* pickle because of it contains high amounts of protein, calcium, phosphorous, iron, and highest amount of carotene amongst the cucurbitaceous vegetables. We formulated and standardized the Spine Gourd (*Momordica dioica Roxb)* using different spices such as cumin, cinnamon, anise, red chilli and fenugreek etc.

Materials and Methods

Ingredients, Chemical and Equipments

Raw materials required during present investigation were procured from local market of Saralgaon such as Spine Guard, ginger, salt, oil, spices, mustard seeds, curry leaves, vinegar, etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane.

Physical and Chemical Analysis

Chemical Analysis such as moisture is determined by using hot air oven, fat is determined by Soxhlet apparatus and protein is determined by using Kjeldahls method. Acidity is determined by using titration method and pH is measured by digital pH meter. All quality parameters were determined by AOAC (2000).

Organoleptic Evaluation

Prepared product were evaluated for sensory characteristics in terms of appearance, color, flavor, aftertaste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale. Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 ‘like extremely’ to 1 ‘dislike extremely’. The obtained results were recorded in sensory score card.

Statistical Analysis

The analysis of variance of the data obtained was done by using completely randomized design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of $p<0.005$ level S.E and C.D. at 5 percent level is mentioned wherever required.

Formation of Spine Gourd Pickles

Spine Gourd Pickles prepared with incorporation varying levels of Spine Gourd and other ingredients were investigated. The formulation was made by varying levels of Spine Guard, ginger, salt, Mustard Seed, Fenugreek Seed Powder, Red Chilli Powder, Turmeric Powder, Asafoetida Powder, Oil, vinegar, curry leaves *viz.*, 70:30, 60:40 and 50:50 percent respectively and data given are illustrated in table.

Where**,**

T0: Control Sample
T1: 50g Spine Guard + 50g Other Ingredients
T2: 60g Spine Guard + 40g Other Ingredients
T3: 70g Spine Guard + 30g Other Ingredients

Sample **T2** of Spine Guard pickle was organoleptically acceptable and used for further study.

Table 1: Table Formulation for preparation of Spine Gourd Pickles

Ingredients	Treatments			
	T0	T1	T2	T3
Spine Guard Fruits	00 g	50 g	60 g	70 g
Mango	70 g	00 g	00 g	00 g
Ginger	00 g	05 g	05 g	05 g
Salt	05 g	10 g	05 g	05 g
Mustard Seed	05 g	10 g	05 g	05 g
Fenugreek powder	02 g	02 g	02 g	02 g
Red Chilli Powder	02 g	02 g	02 g	02 g
Turmeric Powder	02 g	02 g	02 g	02 g
Asafoetida Powder	02 g	02 g	02 g	02 g
Oil	10 ml	15 ml	15 ml	05 ml
Vinegar	02 ml	02 ml	02 ml	02 ml
Curry leaves	00	6-7 (in No.)	6-7 (in No.)	6-7 (in No.)

Preparation of Spine Guard Pickle

Place the chopped Spine Guard in a bowl. All spices were mixed with different variation as per table then frying in pan with addition of oil and salt. Then cool it and vinegar were added in same proportion as mentioned in table. The detail procedure used for preparation of Spine Guard pickle is presented below in flow sheet 1 as per method given by Srivastava and Kumar, 3rd ed. (2002) [13].

Flow sheet for Preparation of Spine Guard Pickle

(Srivastava and Kumar, 3rd ed. 2002) [13]

Spine Guard Fruits
↓
Washing
↓
Cutting into 2-2.5 cm pieces
↓
Frying all pieces of Spine Guard in a little oil
↓
Cooling (at room temp)
↓
Frying all the spices curry leaves in oil
↓
Mixing pieces with fried spices
↓
Frying mixture for 5 minutes
↓
Cooling
↓
Adding into Spine Guard pieces
↓
Addition of oil after heating and cooling it
↓
Adding vinegar
↓
Filling in jar
↓
Keeping in sun for a week (optional)
↓
Storage

Results and Discussion

Table 2: Physical Properties of Spine Guard *(Momordica dioca Roxb.)* Pickle

Parameter	Observation
Color	Green
Length	2.5
Width	0.8
Texture	Soft

From the above table Color of Spine Guard pickle was Green which was determine by visual observation. The length of Spine Guard pickle was 2.5 cm and width of Spine Guard pickle was 0.8cm which was determined by Vernier caliper and Texture was soft determine by visual observation.

Table 4: Chemical Properties of Spine Guard *(Momordica dioca Roxb.)* Pickle

Parameters	Observation Sample (T2)
Moisture	83.4 ± 0.03
TS	16.4 ± 0.09
Protein	2.24 ± 0.10
Ash	4.01 ± 0.08
pH	4.47 ± 0.02
Acidity	0.795 ± 0.07
Fat	6.57 ± 0.02
Carbohydrates	48.30 ± 0.09
Energy Value	469.92kCal

The value of chemical parameter mention in above table which was related to the given reference that pH value of Spine Guard Pickle was found to be 4.47±0.02, Moisture content was found to be 83.4±0.03%, TS 16.4±0.09%, Acidity 0.795±0.07%, Ash content 4.01±0.08%, protein content 2.24±0.10%, fat content 6.57±0.02%, carbohydrate 48.30±0.09% and the energy value is 469.92Kcalvrespectively.

Nutrient Analysis of Spine Guard and Spine Guard Pickle

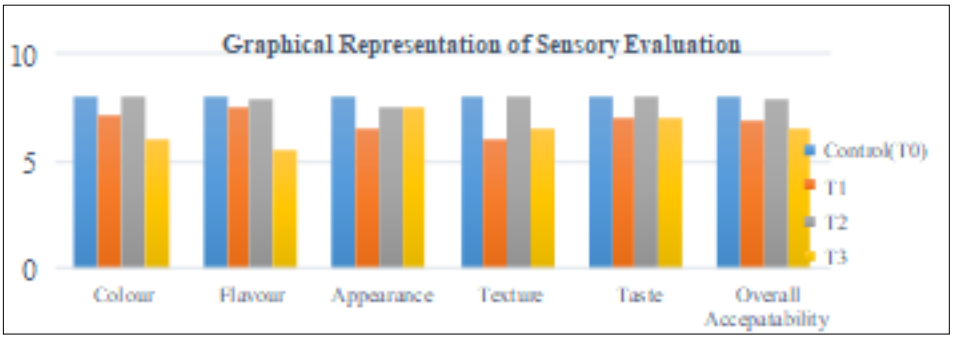
The nutrient analysis of Spine Guard and Spine Guard Pickle such as Vitamin – C was carried out and result obtained were tabulated. Nutrient analysis of Fresh Spine Guard and Spine Guard Pickle was 8.56 and 0.011 mg/100gm which was carried out in food Testing Laboratory.

Table 4

Nutrient Analysis	Vitamin C (mg/100gm)	
Lab Report	Fresh Spine Guard	Spine Guard Pickle
	8.56	0.011

Sensory evaluation

Graphical Representation for Sensory Evaluation of Spine Guard Pickle



Graphical representation of Spine Guard pickle shows that sample T2 has highest scores as compared to other samples. The colour of T2 sample as per graph is 8 point while sample T0 (8), T1 (7.1), T3 (6). The flavor of sample T2 was acceptable with point 7.9 while sample T0 (8), T1 (7.5), T3 (5.5). The Appearance of sample T2 was selected by points 7.8 while other samples points are T0 (8), T1 (6.5), T3 (7.5). The Texture of sample T2 was selected by 8 while other sample points are T0 (8), T1 (6), T3 (6.5). The Taste of sample T2 was selected by 8 while other sample points are T0 (8), T1 (7), T3 (7). The overall acceptability of sample T2 was selected by points 8.1 while other sample points are T0 (8), T1 (6.82), T3 (6.5).

Storage studies of Spine Guard Pickle

Table 4

Sample Period (Month)	Sample	Color	Flavour	Texture	Visual Fungal growth	Remarks
0	Spine Guard Pickle	No change	No off flavour	Firm	No growth	Good
1	Spine Guard Pickle	No change	No off flavour	Slightly Soft	No growth	Good
2	Spine Guard Pickle	No change	No off flavour	Soft	No growth	Good
3	Spine Guard Pickle	No change	No off flavour	Soft	No growth	Good
4	Spine Guard Pickle	No change	No off flavour	Extremely Soft	No growth	Good
5	Spine Guard Pickle	No change	No off flavour	Extremely Soft	No growth	Good

Spine Guard sample was used for storage studies at room temperature (27°C-33°C) for 0-5 months. The effect of storage time (0, 1, 2, 3, 4 and 5 month) on physical properties such as colour, flavour & texture of the pickles were studied and represented. Spine Guard pickle would be assessed after Six months storage in Jars for keeping quality, taste & flavor. The pickle became soft after three month & no visual fungal growth after fifth month but otherwise remained satisfactory upto 6 month of storage.

Conclusion

Conclusively, it emerges that the formulation & standardization of recipe for Spine Guard pickle was carried out successfully prepared by using Spine Guard and other ingredient. The health benefit of Spine Guard are well known so the product is having some enrichment. As regards the organoleptic qualities and Spine Guard pickles processed was excellent followed by Nutritional quality particularly carbohydrate, protein and energy content increased in Spine Guard pickle. This type of value addition by way of nutrient enrichment does certainly help to provide good source of energy. So, the product can be satisfy the consumer in accepts & quality.

References

1. Chaudhari GV, Desai AR, Gawas PM, Velip D, Kumar P. (sahyadrica): a lesser-known albeit important traditional vegetable. Current Science, 2023, 124(3).
2. Deepak Kumar Jha, Raju Koneri, Suman Samaddar. Potential Bio-Resources of Momordica dioica Roxb: A Review. Int J Pharm Sci Rev Res,2017:45(2):203-209. Article No. 37.
3. Hosain MM, Jannat R, Islam MM, Sarker MKU. Processing and Preservation of Okra Pickle. J Progress Agriculture,2010:21(1-2):215-222.
4. Janani P, Balusamy A. Kerala Karshakan e-Journal. December 2018.
5. Weerasinghe MGWK, Dahanayake N. Momordica dioica Roxb (Spine Gourd)- An underutilized vegetable and medicinal plant in Sri Lanka. Int J Minor Fruits, Medicinal and Aromatic Plants,2021:7(2):100-104.
6. Anjamma M, Lakshmi Bhavani N. Comparative Antibacterial and Antioxidant activity from root and fruit extracts of Momordica charantia L. and Momordica dioica Roxb. IJSRST,2018:(4)5:1710-1716.
7. Patel MG, Ishnava KB. Momordica dioica Roxb. (Spine Gourd): Multiple shoot induction from nodal cultures and its antidiabetic activity. J Med Plants Studies,2015:3(6):82-88.
8. Raut PS, Gadekar NK, Mokale B, Sanap G. Review on Momordica dioica. World J Pharm Res, 2023, 12(5).
9. Pandey A, Singh A, Garg P, Raja RB. A Novel Method to Produce Low Salinity and Healthier Indian Lemon (Citrus limonum). Ann Biol Res,2011:2(1):187-194.
10. Pundir RK, Jain P. Evaluation of Five Chemical Food Preservatives for their Antibacterial Activity Against Bacterial Isolates from Bakery Products and Mango Pickle. J Chem Pharm Res,2011:3(1):24-31.
11. Basumatary P, Bora GC, Kalita UC, Saikia L, Deka NC. Variability and correlation studies in spine gourd (Momordica dioica Roxb.). DRJAFS,2014:2(7):77-81.
12. Bhagat S, Sinha SK, Tiwari JK. Identification and Evaluation of Morpho-Physiological Variation in Spine Gourd (Momordica dioica Roxb.). Int J Curr Microbiol App Sci,2017:6(11):531-540.
13. Srivastava RP, Kumar S. Fruits and Vegetable Preservation. 3rd ed. CBS Publisher and Distributors Private Limited, 2002.
14. Saroj Singh KK. Standardization of Recipe and Method for Mango Pickle. Int J Chem Stud,2018:6(2):2033-2037.
15. Saranraj P, Karunya SK, Sivasakthivelan P, Sivasakthi S. Prevalence of Bacterial and Fungal Pathogens in Fruits and Pickles. Sci Park Res J,2016:3(36):1-9.
16. Thakur NS, Kumar D, Thakur A, Chauhan M, Kumar P. Studies on Development and Storage Quality of Seedling Mango (Mangiferaindica L.) Pickle of Himachal Pradesh. Indian J Ecol,2017:44(6):690-696.
17. Dakhure VK, Gachande BD. The Study of phytochemicals, Traditional and pharmacological uses of Momordica dioica Roxb. ex. willd: A review. Int J Innov Res Multidiscip Field, 2021, 7(7).
18. Vasugi C, Sekar K, Dinesh MR, Suresh ER. Evaluation of Unique Mango Accessions for Whole Fruit Pickle. J Horti Sci,2008:3(2):156-160.