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Development and Sensory Attributes of the Pickle made from Bitter Gourd and Bottle Gourd

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Abstract: ***Bitter gourd has long been used as a food and medicine. It is the rich source of vitamins C, A, B1, B2, B3, B9. Bottle gourd is beneficial for lipid metabolism. Both fruit vegetables help to control blood glucose. The present study has been design to develop a special pickle for diabetic patients, which would mask the bitterness of bitter gourd as well as could support to control the sugar level naturally through diet as both the ingredients of the pickle has property to lower the sugar level in blood. Materials used for the development of ant diabetic pickle were bitter gourd, bottle gourd, mustard seeds, fenugreek, asafoetida, turmeric, clove, fennel, salt, red chilli powder and oil. Mustard seeds were used in more quantity as compare to other spices. Six different samples A, B, C, D, E and F with different proportions of ingredients such as bitter gourd 100, 80, 60, 40, 20, 00 and bottle gourd 100, 80, 60, 40, 20, 00 gms. While spice mix, salt and oil kept constant for each sample. Sensory analysis was performed for each sample by using hedonic scale. Depending on the sensory evaluation we conclude that Sample 'C' was the most acceptable sample for chemical analysis and commercial production.***

Keywords: Bitter gourd, Bottle gourd, Antidiabetic, Pickle

1. Introduction

Bitter gourd is one of the most nutritious vegetable with many medicinal properties but it is unutilised in the processing sector due to its bitter taste and therefore attempt was made to develop a pickle which would mask the bitterness of bitter gourd. Momordicacharantia has long been used as a food and medicine [1].For medicinal purpose the fruits may be used fresh as pulp or juice or dry in powders or in fluid extracts [2]. It belongs to the Cucurbitaceae family and grows in the humid and subtropical region.

Morphologically, the bitter melon is unherbaceous vine which bears tendrils and it creeps along the support [3]. The bitter gourd fruit is ovoid, ellipsoid or spindle shaped, usually ridged or warty, dehiscent, irregularly as a three valved fleshy capsule or indehiscent. The young fruit is emerald green, turning to orange- yellow when ripened. On maturity, the fruits splits into three irregular valves that curl backward and release numerous reddish-brown or white seeds encased in scarlet arils seeds and pith appear as white color in unripe fruits, and red during ripening process [4]. Fresh bitter gourd is used as a nourishing food. It contains 93.8% water, 0.9% protein, 0.1% lipid, 3.3% dietaryfibre, 20 KJ energy per 100 gm and 0.05% vitamin C. It is a good source of phenolic compound [5]. The fruits contain high amount of vitamin C, vitamin A, vitamin E, vitamin B1, B2, B3 as well as vitamin B9(folate).

The fruit is also rich in minerals including potassium, calcium, zinc, magnesium, phosphorus and iron and is good source of dietary fibre [6]. It has a non-nitrogenous neutral principle *Charantin* and on hydrolysisgives glucose and sterol. The fruit pulp of MomordicaCharantia has soluble pectin but no free pectic acid. Galactouronic acid is also obtained from the pulp. The fruits contain glycosides, saponin, alkaloids, reducing sugar, resins, phenolic constituent, fixed oil and free acids [7], [8].The pure protein termed as P- insulin extracted from Momordica Charantia fruits in crystalline form as also tested [7], [8]. Bitter gourd has following properties. 1) Bitter melon is composed of various chemicals that have a hypoglycaemic activity. That is they reduce the amount of sugar in the blood. 2) Bitter melon stimulates appetite.3) Bitter melon helps in the entire digestion process. Hence it is used in treatment of digestive problems.4) Bitter melon has emetic, purgative and anthelmintic properties. It is also anti-flatulent. 5) Bitter melon is used in dissolution of fats from the body. It is known to have anti-lipolytic properties. 6) Bitter melon possesses all the essential vitamins in good amount, such as vitamin A, thiamine, riboflavin, vitamin C and also minerals like iron. 7) Bitter melon is anti- inflammatory and astringent. It has specific action on the movement of bowels [9], [10]. The immature fruits of bitter gourd can be prepared in many ways such as frying or cooking as curries. In addition, fruits can be dehydrated, pickle or canned [11]. They are usually blanched or soaked in salt water before cooking to reduce bitter taste. Study suggests that incorporating bitter foods in commonly consumed food dishes can mask the bitter taste of bitter gourd [12]. Lagenariasiceraria of family Cucurbitaceae is an excellent fruits which consist of some of the essential constituents which are necessary to maintain good health of human beings. Bottle gourd is an important member of the Cucurbitaceae family and is cultivated throughout the India. Bottle gourd is also known Doodhi, lauki, (Hindi) kadoo, (Marathi) is official in Ayurvedic pharmacopeia [13]. Bottle gourd is used as vegetable and is good source of vitamin C [14].

Table of nutritional value: [15], [16], [17], [18].

Nutrients	Fruits	Seeds
Proximates		
Protein (gm)	0.62	24.54
Fat (gm)	0.02	45.85
Carbohydrate (gm)	3.39	17.81
Fibre, total dietary (gm)		3.90

Minerals:		
Calcium (mg)	26	43
Iron (mg)	0.20	14.97
Magnesium (mg)	11	535
Phosphorous (mg)	13	1174
Potassium (mg)	150	807
Sodium (mg)	2	18
Zinc (mg)	0.70	7.46
Copper (mg)	0.026	1.387
Manganese (mg)	0.066	3.02
Selenium (mg)	0.2	5.60

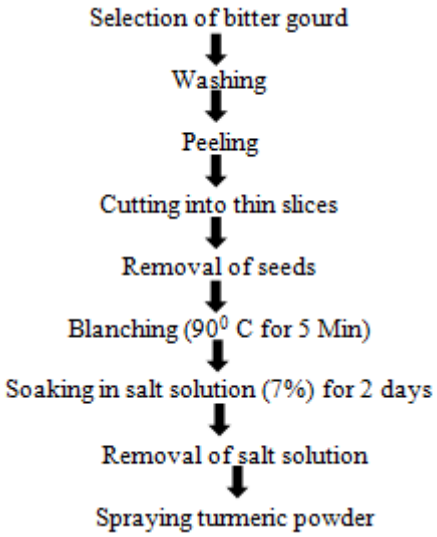
Vitamins:		
Vitamin C, total ascorbic acid (mg)	10.1	1.9
Thiamine (mg)	0.029	0.21
Riboflavin (mg)	0.022	0.320
Niacin (mg)	0.320	1.745
Pantothenic acid (mg)	0.152	0.339
Vitamin B6 (mg)	0.04	0.224
Folate food (mcg)	6	58
Vitamin B_{12}(mcg)	-	-
Vitamin A, IU (IU)	16	380
Vitamin E (mg)	-	1.000
Choline (mg)	16.02	-

Lipids:		
Fatty acid, total saturated (gm)	0.002	8.674
Fatty acid, total monounsaturated (gm)	0.004	14.258
Fatty acid, total poly unsaturated (gm)	0.009	20.904

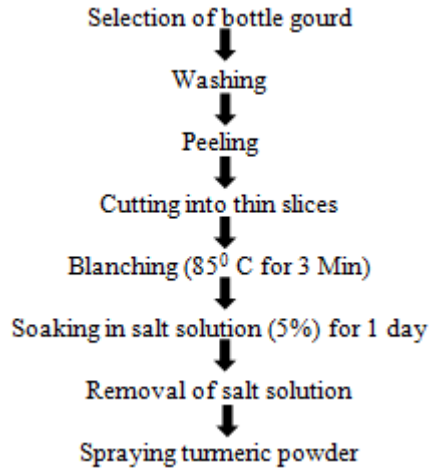
Anino acids:		
Tryptophan (gm)	0.003	0.431
Threonine (gm)	0.018	0.903
Isoleucine (gm)	0.033	1.264
Leucine (gm)	0.036	2.079
Lysine (gm)	0.021	1.833
Methionine (gm)	0.004	0.551
Cystine (gm)	-	0.301
Phenylalanine (gm)	0.015	1.222
Tyrosine (gm)	-	1.019
Valin (gm)	0.027	1.972
Arginine (gm)	0.014	4.033
Histidine (gm)	0.004	0.681
Alanine (gm)	-	1.158
Aspartic acid (gm)	-	2.477
Glutamic acid (gm)	-	4.315
Glycine (gm)	-	1.796
Proline (gm)	-	1.000
Serine (gm)	-	1.148

Lagenariasiceraria is quiet beneficial in controlling the blood glucose level, without producing hypoglycaemia; additionally, it improves lipid metabolism and represent a protective mechanism against the development of atherosclerosis and prevents diabetic complication from lipid peroxidation by improving the antioxidant status as found in experimental diabetic rats [19]. Traditionally it is used as vermifuge, purgative, diuretic and as an anti-inflammatory agent [20] and is also recommended for increasing the lactation in lactating mother. It is reported to possess antithepatoxic and antiulcer activities [21]. Development of pickle from bitter gourd and bottle gourd is a good option to increase the utilization as well as shelf life of these vegetables. The pickle can be made more delicious by using different spices like fenugreek, mustard, asafoetida, turmeric and clove. Mustard seed was used in more quantity as compare to other spices.

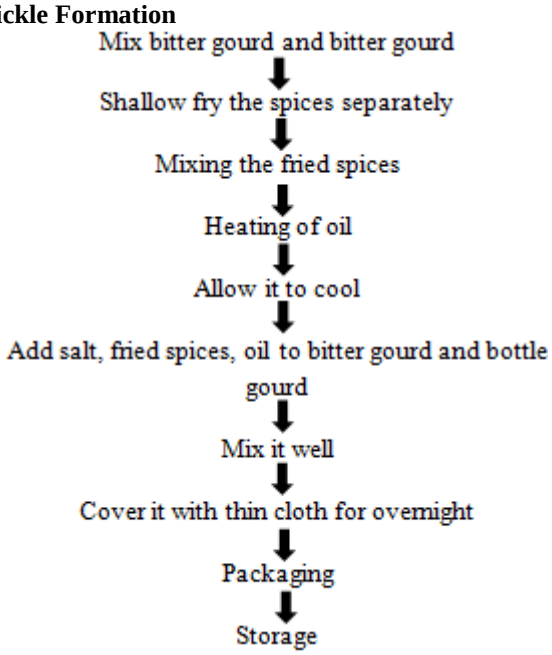
a) Pre-treatment of Bittergourd



b) Pre-treatment of Bottle gourd



c) Pickle Formation



2. Material and Method

2.1 Pre-treatment of Bitter Gourd

Good quality bitter gourds were procured from the local vegetable market of Nashik, Maharashtra. Bitter gourds were washed with clean water to remove soil portion. The stem portion cut down and peels were removed by the peeler. The bitter gourds were cut into slices and then blanched at 90^0c for 4 minute. The blanched slices were then deeped in 7% salt solution for 2 days

2.2 Pre-treatment of Bottle Gourd

Good quality bottler gourds were procured from the local vegetable market of Nashik, Maharashtra. Bottle gourds were washed with clean water to remove soil portion. The stem portion cut down and peels were removed by the peeler. The bottle gourds were cut into cubes and then blanched at 85^0c for 3 minute. The blanched slices were then deeped in 5% salt solution for 1 day.

2.3 Preparation of Spice Mix

Good quality different spices like mustard seed, fenugreek seed, asafoetida, turmeric, red chilli powder were selected from the market. These spices were shallow fried one by one. The spice mix was obtained by mixing all the shallow fried spices

2.4 Preparation of Pickle Formulation

The pre-treated bitter gourd and bottle gourd were mix thoroughly in different proportions in order to know the acceptability of pickle from these combination. Various proportions are given in the table 2.

Table 2: Formulation of bitter gourd and bottle gourd

Sample	*Bitter gourd*	*Bottle gourd*
A	100	00
B	80	20
C	60	40
D	40	60
E	20	80
F	00	100

The bitter gourd and bottle gourds pre-treated pieces were mixed in various proportions. Then shallow fried spices were added to pre-treated bitter gourd and bottle gourd slices. Then 12 % salt was added to the above mixture and uniformly mixed. Finally Oil was added to the mixture till all the slices deeped in the oil. The prepared pickle is stored in sterilized glass jar and kept in aseptic condition for 2 weeks.

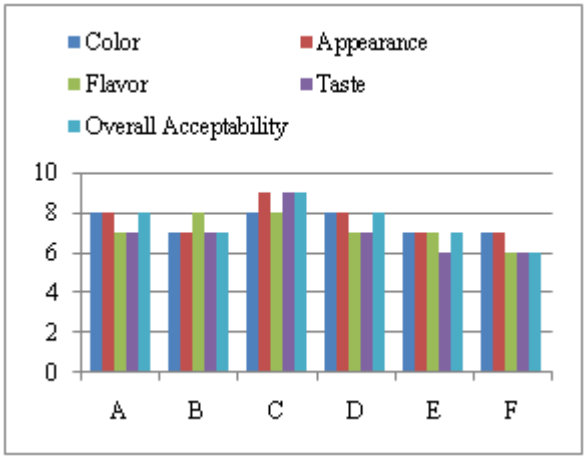
3. Result and Discussion

The bitter gourd and bottle gourd were blended in various proportions as stated in table 2. The spice mix, oil and salt were kept in same proportion. This experiment was replicated two times and total 10 sample of pickle were prepared and served to 20 semi trained panellist to judge the different sensory attributes. The samples were scored for the different attributes like colour, flavour, taste, appearance and overall acceptability by using hedonic scale and its mean was calculated. The mean score obtained for the different attributes are given in table no.3

Table 3: Sensory Analysis

Attributes	Sample					
	A	B	C	D	E	F
Color	8.0	7.0	8.0	8.0	7.0	7.0
Appearance	8.0	7.0	9.0	8.0	7.0	7.0
Flavor	7.0	8.0	8.0	7.0	7.0	6.0
Taste	7.0	7.0	9.0	7.0	6.0	6.0
Overall Acceptability	8.0	7.0	9.0	8.0	7.0	6.0

Colour and appearance of pickle made by mixing bitter gourd and bottle gourd was found excellent as per the organoleptic scores. The organoleptic scores for the taste range from 6-9 and the highest hedonic score was for the sample C which was found to be 9 and was superior than other treatments. The organoleptic score for the flavour ranged from 6-8 and the highest score recorded for the samples B & C. Sample C was having higher overall acceptability than other treatments. The sample C in which bitter gourd and bottle gourd was in the ratio 60:40 was the most acceptable sample of pickle.



4. Conclusion

From the sensory evaluation results we conclude that „C" sample was the most acceptable sample for chemical analysis and commercial production and bitter gourds as well as bottle gourd are good option for the preparation of pickle when used together.

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