J Krishi Vigyan 2019, 8 (1) : 70-75 DOI : 10.5958/2349-4433.2019.00076.X

Effect of Processing Techniques on Quality and Acceptability of Bitter Brinjal Pickle

Y. Prabhabati Devi

ICAR-Manipur Centre, Krishi Vigyan Kendra, Chandel (Manipur)

ABSTRACT

The present study aimed at the formulation of organoleptic accepted bitter brinjal pickle. Commonly used preservatives vinegar, acetic acid, salt and oil were added at different ratios to study the shelf life for a period of one year and also changes in colour, flavor, texture and appearance of fungus. The results showed that bitter brinjal pickle stored successfully for 45 d at ambient temperature (26±4◦C) without any significant change in the quality attribute after incorporation of vinegar as a common preservative. The result showed that preservation of bitter brinjal with vinegar was the best method for extending the shelf life and to retard microbial load.

Key Words: Bitter brinjal, Preservatives, Sensory, Shelf life.

INTRODUCTION

Bitter brinjal is a fruit plant from the genus *solanum* family of the *solanacene*. It is widely used as vegetables and also as a traditional medicine. It is highly perishable and the shelf life can be extended by preserving in the form of pickle. Pickle is a good appetizer consumed by all age of people which contain large amount of lactobacilli bacteria which are important for the digestion of grains and vegetables which have usual beneficial probiotic properties used by the body. For pickling proper concentration of salt is very important for better shelf life and also to reduce the infestation of mold, yeast and bacteria. If salt concentration is less, the product gets slimy, soft and holds lots of water. Therefore the average salt concentration should not be less than 5.3 per cent. Sensory attribute is one of the important factors govern the consumers acceptance of food products and their purchase intent. The overall quality of any food product is related to several sensory attribute like appearance, texture and flavor (Barrett *et al*, 2010; Nandane and Jain, 2011). Texture is also one of the most important sensorial quantitative characteristics of pickle and its effect on product acceptance by the buyer is crucial (Sadeghizadeh *et al*, 2018).

The process of pickle production is carried out under optimal condition, some changes occur in the texture of primary products which affects the quality of pickle as reported by Rodrige and Alvarruiz (2010). Mustard oil, salt, and vinegar are the common preservative used for long time back (Devi, 2013). The popular common pickle prepared by the women entrepreneurs are mango, chilli, bitter brinjal, mixed vegetable, garlic, wild apple, hog plum, fish pickle etc. But the quality and shelf life of these pickles are of question. The problem of shelf life of bitter brinjal pickle is higher in Manipur as it is highly perishable and hence an attempt is made to minimize the spoilage by the proper use of preservatives and also to select good quality bitter brinjal. The present study was undertaken to prepare bitter brinjal pickle by use of different preservatives, to observe shelf life at different storage period, to evaluate the fungal growth and also to assess the overall acceptability of pickle by sensory evaluation.

MATERIALS AND METHODS

The fresh, matured, healthy bitter brinjal were collected from Imphal market and other ingredients like spices, oil, acetic acid and vinegar were also

Corresponding Author's Email: prabhayumnam@rediffmail.com

Table1. Method of selection of sample with different treatment.

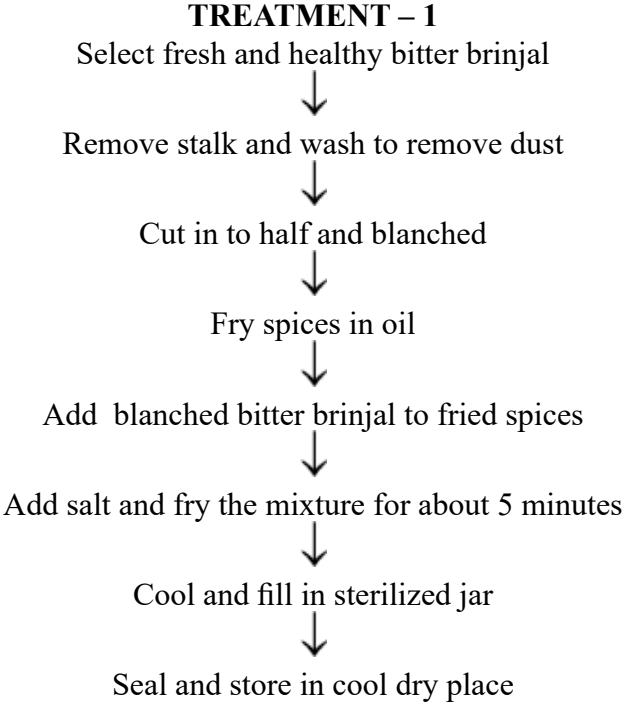
Sample	Treatment
Sample 1	Blanched bitter brinjal +3.5 per cent salt + spice + 15per cent mustard oil and store in sterialised glass bottle
Sample 2	Blanched bitter brinjal + 5per cent salt + spice + 20per cent mustard oil and store in sterialised glass bottle
Sample 3	Blanched bitter brinjal + 6per cent salt + spice + 25per cent mustard oil and store in sterialised glass bottle
Sample 4	Blanched bitter brinjal + 9per cent salt + spice + 30 per cent mustard oil + 1.5 per cent Acetic acid and store in sterialised glass bottle
Sample 5	Vinegar cured blanched bitter brinjal +10per cent salt + spice+35per cent mustard oil and store in sterialised glass bottle

collected from the local market. The experiment was conducted for a period of one year. Observation was recorded at the end of every month for the period of 2m and at 2m interval for the period up to12m in order to see any change in colour, flavor, texture and appearance of fungus. Method of collection of sample along with treatment was shown in Table1.

Method of preparation pickle

The recipe of the bitter brinjal pickle is given in Table 2. Select fresh, mature bitter brinjal and wash thoroughly with tap water to remove dust and dirt. Then remove stalk and cut in to half. Blanch it for 5 min at a temperature 96-98º C and drain water properly. Fry spices in oil and add blanched bitter brinjal and mix it properly. For storing pickle glass jar was sterialised at 100°C and dry it properly. In some treatment like T_4 acetic acid was used and in T_5 vinegar was used. For making bitter brinjal pickle, mustard oil was heated and put all the spices, fry for few seconds and added the blanched bitter brinjal and fry for 4-5 minutes in low flame till it blended properly. Salt and remaining oil were added. The fried bitter brinjal pickle was cooled, filled in to sterilized glass bottle and sealed airtight. The flow chart for the preparation of bitter brinjal pickle was shown in fig 1. For treatment like T_4 acetic acid was added just before removing from fire and in case of T_5, blanched bitter brinjal was cured in vinegar overnight and drain vinegar water and other process remain same with other treatments.

Fig 1. Flow chart for the preparation of bitter brinjal pickle.



RESULTS AND DISCUSSION

Observation of fungus growth

The fungal growth developed in bitter brinjal pickle at different storage period was examined through visual observation. Details of the observation were given in Table 3. Up to 45 days storage, no fungal growth was observed. During 2nd month of storage, the fungal growth was observed in T_1 due to

Effect of Processing Techniques

Table 3. Visual observation of fungus growth developed in bitter brinjal pickle at different storage.

Storage Period (Month)	Sample	Fungal Growth	Storage Period (Month)	Sample	Fungal Growth
1month	S1	No Growth		S1	Excessive
	S2	No Growth	8 month	S2	Excessive
	S3	No Growth		S3	Slightly
	S4	No Growth		S4	No Growth
	S5	No Growth		S5	No Growth
2month	S1	Slightly Growth	10 month	S1	Excessive
	S2	No Growth		S2	Excessive
	S3	No Growth		S3	Slightly growth
	S4	No Growth		S4	No Growth
	S5	No Growth		S5	No Growth
4 month	S1	Slightly Growth	12 month	S1	Excessive
	S2	No Growth		S2	Excessive
	S3	No Growth		S3	Excessive
	S4	No Growth		S4	No Growth
	S5	No Growth		S5	No Growth
6 month	S1	Excessive			
	S2	Slightly Growth			
	S3	No Growth			
	S4	No Growth			
	S5	No Growth			

low concentration of salt and mustard oil. Whitish fungal growth was observed on the surface of the pickle may be due to spices, other ingredients, from the air or from lid of the jar. From 6th m to 12 m, excessive growth of fungus was observed in case of T_1 and T_2 and other treatments like T_3 there was slight growth by fungus. In treatment like T_4 and T_5, there was no fungal appearance on the surface of the pickle due to high concentration of salt, mustard, acetic acid and vinegar. The covering of oil as well as proper concentration of salt helped to prevent microbial contamination and vinegar and acetic acid helped to maintain the proper *pH* of the pickle.

Storage studies of bitter brinjal pickle

Bitter brinjal pickles were stored at room temperature. The deterioration of the product was observed at a regular interval of one month up to 2 m and at 2 m interval for a period up to 12 months. The change in color, flavour and texture were observed for a period of 1 year. Five different sample bitter brinjal pickles were used for storage studies at room temperature of 26^0 – 30^0 C from 1m to 12m. The effect of storage time on physical properties such as colour, flavour and texture of the pickles were studied. The processed bitter brinjal pickles were in good condition up to 45 days in case of T_1 and in case of T_5, it was up to 12 months. For T_1 and T_2, change in color, flavour and texture started from 4th months onwards which was shown in Table 4.

Table 4. Storage life of bitter brinjal pickle.

Shelf life (month)	Sample	Colour	Flavour	Texture	Remark
1	S1	No change	No off flavour	Firm	Good
	S2	No change	No off flavour	Firm	Good
	S3	No change	No off flavour	Firm	Good
	S4	No change	No off flavour	Firm	Good
	S5	No change	No off flavour	Firm	Good
2	S1	No change	No off flavour	Firm	Good
	S2	No change	No off flavour	Firm	Good
	S3	No change	No off flavour	Firm	Good
	S4	No change	No off flavour	Firm	Good
	S5	No change	No off flavour	Firm	Good
4	S1	Change	Off flavour	Soft	Slightly spoiled
	S2	No change	Slightly off flavour	Slightly soft	Fair
	S3	No change	No off flavour	Firm	Good
	S4	No change	No off flavour	Firm	Good
	S5	No change	No off flavour	Firm	Good
6	S1	Change	Off flavour	Extremely soft	Spoiled
	S2	Change	Off flavour	Soft	Slightly spoiled
	S3	Slightly change	Slightly off flavour	Slightly Soft	Fair
	S4	No change	No off flavour	Firm	Good
	S5	No change	No off flavour	Firm	Good
8	S1	Change	Off flavour	Extremely soft	Completely spoiled
	S2	Change	Off flavour	Extremely soft	Spoiled
	S3	Change	Off flavour	Soft	Slightly spoiled
	S4	No change	No off flavour	Firm	Good
	S5	No change	No off flavour	Firm	Good
10	S1	Change	Off flavour	Extremely soft	Completely spoiled
	S2	Change	Off flavour	Extremely soft	Spoiled
	S3	Change	Off flavour	Extremely soft	Spoiled
	S4	Slightly change	Slightly off flavour	Soft	Slightly spoiled
	S5	No change	No off flavour	Firm	Good
12	S1	Change	Off flavour	Extremely soft	Completely
	S2	Change	Off flavour	Extremely soft	Completely
	S3	Change	Off flavour	Extremely soft	Spoiled
	S4	Change	Off flavour	Soft	Slightly spoiled
	S5	No change	No off flavour	Firm	Good

Table 5. Mean score for performance of colour flavour, texture and overall acceptability of various sample of bitter brinjal pickle.

Sample Code	Sensory attributes				
	Colour	Flavour	Texture	Taste	Overall acceptability
S1	6.0	6.2	6. 8	6.5	6.6
S2	6.3	6.5	7.0	6.8	6.8
S3	6.5	6.8	7.2	7.1	7.0
S4	7.0	7.2	7.3	7.4	7.5
S5	7.5	7.6	7.8	7.6	8.0

This may be due to lack of proper concentration of preservatives like salt and mustard oil. In case of T_3, changes started from 6m onwards and for T_4, changes started from 10m onwards due to lack of right concentration of preservatives like vinegar and acetic acid. For T_5, there was no change in color, flavour and texture up to 12m as the blanched bitter brinjal was cured in vinegar for overnight and right concentration of salt and mustard oil were added which helped to extend the shelf life up to 12m.

Sensory evaluation of bitter brinjal pickle

The consumer's acceptability of processed bitter brinjal pickle was evaluated by a taste testing panel. The hedonic rating test was used to determine the acceptability of pickle. The 20 panelists were selected from women entrepreneur of Imphal, Manipur. Panelists were asked to give scores for characteristic color, flavour, texture, taste and overall acceptability of the processed bitter brinjal pickle. The scale was arranged such that 9 = like extremely, 8 = like very much, 7 = like moderately, 6 = like slightly, 5 = neither like or dislike, 4 = Dislike slightly, 3 = Dislike moderately, 2 = Dislike very much, 1 = Dislike extremely. The mean score of performance of bitter brinjal pickles were presented in Table 5. From the table, it is seen that T_5 secured the highest score: 7.5 for colour, 7.6 for flavour, 7.8 for texture, for taste 7.6 and 8.0 for overall acceptability and was ranked 8 (like very much). It also showed that T_1 got the lowest value than the other sample. So, this indicated that color, flavour, texture, taste of T_5 is more acceptable than the others.

CONCLUSION

Bitter brinjal pickle is highly perishable. Therefore, proper preservatives like salt, mustard oil, acetic acid and vinegar should be used in proper concentration to extend the shelf life of the pickle. From this study, it was found that fungal growth was a great problem of pickle. If we add proper concentration of preservatives, the fungal growth becomes very low. The panelists also tested the product and gave the score for color, flavour, texture, taste and overall acceptability. The score of panel test indicated that among the five treatments, the pickle which was prepared with vinegar cured blanched bitter brinjal (T_5) was the most acceptable. In case of shelf life, T_5 have better shelf life than other 4 treatment. It was proved thatT_5 is the best method for extending the shelf life and also for improving the quality of the pickle. This study gives a good prospect on processing of bitter brinjal. This technology may be adopted on large scale by the women entrepreneurs and farm women in order to generate income and occupy a space in the market.

REFERENCES

Goel A K, Kumar R and Mann S S (2007). *Postharvest Management and Value Addition*. Daya Publishing House, Trinagar, New Delhi - 110 035.

Devi Y Prabhabati and Roy S S, Devi Y I , Kabui G B and Prakash N (2013). *Delights of Fruits and Vegetables*, published by ICAR, Manipur Centre, Imphal.

Shanta F, Rajib R, Alim M and Haque M (2014). Studies on preparation of amaranth pickle. *J Bangladesh Agril Univ* 12(1): 177-182. http://dx.doi.org/10.3329/jbau.v12i1.21409

Girdhari L and Siddapa G S (2014). *Chutney, sauce, pickle, preservation of fruits and vegetables*. ICAR Publication, New Delhi.

Hoque F (2001). *Processing of Pickle from Mango, Tomato, and Green Chilli*, M.Sc. Thesis, Department of Food Technology and Rural Industry, Bangladesh Agricultural University, Mymensingh.

Mishra P, Verma M, Mishra V, Mishra and Rai GK (2011). Study on development of ready to eat amla chutney and its preservation by using class one preservative. *Am J Fd Tech* **6** (3):244-252

Mudabi S R and Rajagopal M V (1982). *Fundamentals of Food and Nutrition*, Wilsey Eastern Publication, New Delhi.

Rani U M (1992). *Studies on Quality Standard of India Commercial Pickle*, Indian Food Packers, India 40 (6).

Sangeeta A Pingale and Vaibhav R Dabhade (2015) Development and sensory attributes of the pickle made from Bitter gourd and Bottle gourd. *Int J Sci Res* **4**(10): 1787-1790

Shahzor Gul Khaskheli , Wen Zheng , Saghir Ahmed sheikh , Ashfaque Ahmed Khaskheli , Ying Liu , Yan-Feng Wang and Wen Huang (2015). Effects of processing techniques on the quality and acceptability of Auricularia auricular Mushroom pickle'. *J Food and Nutr Res* **3**(1):46-51

Srivastava R P and Kumar S (2003). *Fruit and Vegetable Preservation.* Indian Food Packer, Lucknow.

Received on 03/07/2019 *Accepted on 14/10/2019*