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Studies on changes occurred during preparation and storage of mango (*Mangifera indica*) pickle

Ram Rakha*, Dr. V. K .Tirpathi

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Cutout of mango pickle at different storage period for organoleptic and chemical analysis reveled at the initial stage mango pickle prepared from langra variety under unpeeled sour treatment (T_3) was found best among all the samples . While unpeeled sour pickle (T_1) prepared from Chausa variety was rated lowest . After one month storage period , unpeeled sour pickle of Deshi variety was rated best among other sample . While lowest score have observed in peeled sour pickle (T_1) prepared from Chausa variety .Evaluation done after three months of storage period the maximum rating was confind to unpeeled sour pickle (T_3) prepared from Deshi variety of mango . While lowest score have observed in unpeeled sweet sour pickle (T_4) prepared from chausa variety . Evaluation done after six months of storage period the maximum rating observed in unpeeled sour pickle prepared from Deshi and langra variety of mango. While minimum rating was observed in unpeeled sweet sour pickle (T_4) prepared from chausa variety of mango.

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Introduction

The mango is most popular and choicest fruit of India and occupies a prominent place among the best fruit of the world . Few other tropical fruit have the historic reputation that mango possess and few other are so intimately connected with Indian Folklore . It has been cultivated in India for at least 4000 year and recent studies on the genus in the Assam-Burma , Thialand region where truly wild mango trees belonging to both M. indica and M. Sylvastica have been recorded . It is summarized that natural hybridization between the evolution of the cultivated mango.

The introduction of mango in the other parts of the world is comparatively recent . It is now cultivated in Southern China Malaya Indonesia , Warmer parts of Australia , Philippines, Hawalii and West indies, Madagaskar and along the coast of tropical Africa .

In North America it is grown to limited extent in Florida and California. The total world production is estimated at 15 million tonnes out of which 9.5 million tonnes is contributed by India.

The preservation of fruit and vegetable in the from of pickle is one of the oldest art practiced widely all over the world . In India a variety of condiments are used in these pickles for flavouring purpose and some of these in turn also effect a changes in the microbial flora these type and quantity of condiments to be added , evolved through experience ,do not always lead to successful preservation of the pickle . This is especially so in the case of vegetable pickle which need proper curing in brines to improve their colour ,texture and quality**. [1]** Pickling is practiced in India to preserve the seasonal fruit such as Mango Lemon etc. and no microbial fermentation is envisaged as in the case of dill pickle. High salt concentration generally prevents microbial attack . Moreover , the surface is covered with a layer of edible oil which prevent exposure of the pickle to atmosphere there by prevent spoilage by micro-organisms. In spite of the precaution taken during the preparation and storage , sometimes pickle do get spoiled .The spoilage includes alteration flavour , colour , texture of fruit such as softening , blackening slime production ropiness, mushy texture unpleasant odour bubbling etc. **[2]**

Methodology

Mango fruit of four varieties Viz, Safeda , Chausa , Langra and Deshi were procured from Mal ihabad Lucknow . The care was taken during procurement that the fruit should be green mature but unripe and free from blemishes or disease. The fruit were of same size colour and maturity . The fruit were of packed in bags and transported to laboratory on same day.

SN.	Variety	Condition	Treatments
1.	Safeda	A-Peeled	T1-Sour T2-sweet sour
		B-Unpeeled	T3-sour T4-Sweet sour
2.	Chausa	A- peeled	T1-Sour T2-sweet sour
		B-Unpeeled	T3-Sour T4-Sweet sour
3.	Langra	A-Peeled	T1-Sour T2-sweet sour
		B-Unpeeled	T3-Sour T-sweet sour
4.	Deshi	A-Peeled	T1-Sour T2-sweet sour
		B-Unpeeled	T3-Sour T4-sweet sour

Fruits were washed with potable tap water thoroughly. Fruit were kept under fan to dry water droplets present on skin of fruit, These fruit were analyzed for physical and chemical characters.

The fruit were peeled separately (under different lots) with the help of stainless steel knife and peeled and unpeeled fruit were cut in to quarter pieces .The kernel were removed priory. The treatments given for pickle preparation were as under.

Salt	150gm
Turmeric	20gm
Mustard	20gm
Red chill powder	20gm
Methi	10gm
Kalauzi-	20gm
Saunf=	20gm
Cumin=	5gm
Black pepper=	4gm
Badi Elaichi-	5gm
Hing	1gm
Mustard oil-	200gm

For preparation of sour pickle added 5% sugar and spices per kg of pieces as given in recipe.

Salt	150gm
Termeric	20gm
Mustard powder	20gm
Red chilli powder	20gm
Methi	10gm
Kalauzi	20gm
Saunf	20gm
Cumin	5gm
Black pepper	4gm
Badi Elaichi	5gm
Hing	1gm
Suagr	50gm

Chemical analysis of pickle

The pickle prepared under different treatments were analyzed for different chemical characters like ,pH, T.S.S. acidity, ascorbic acid , Reducing sugar ,Non-reducing sugar and Total sugar ,Salt at initial stage (just after preparation) after 1month 3 month 6 months storage period the estimation method were same as described earlier under chemical analysis were also carried out by numerical score method as stated by at each stage .

Organoleptic evaluation

Organoleptic evaluation was carried out by panel of five semi trained judges for colour, texture, flavour and taste at the different storage period. The method of organoleptic evaluation were same as numerical score method as described by [**3].** The panel of judges was same for all the stages of evaluation.

Result and Discussions

An experiment was conducted with a view to study the possibilities of mango for preparation of pickle "at Government Fruit preservation and Canning Institute Lucknow" in the year 1993-94. Mango Varieties Safeda ,Chausa ,Langra & Deshi , were procured from Malihabad, Lucknow (U.P) Pickle prepared – peeled-T1-Sour ,T2-Sweet Sour ,unpeeled –T3sour, T4-sweet sour pickle of Safeda, Chausa, Langra &Deshi , varieties of mango . In sweet sour pickle added 5%sugar and the method used for preparation of mango pickle was as per standard method . All the samples of mango pickle were stored at the same place in laboratory at room temperature [4].

The cutout analysis was done for pH .,T.S.S. acidity ,ascorbic acid ,T.S.S., Total sugar Non reducing sugar and salt contents in fresh fruit and in mango pickle , just after preparation and after one month three months and six months of storage period .The organoleptic evaluation for colour ,flavour , texture and taste was done by a panel of five judges along with chemical analysis at each stage of studies .The fruit weight, circumference, length, volume and specific gravity was recorded of each variety Safeda 140.40gm ,9.55cm , 14.90cm , 1.01, Chausa-194.40gm,13.10cm.,17.80cm.,1.02,Langra232gm,11.34cm,18.55 cm, 1.02 and Deshi -92.20gm,14.10cm,14.20cm,1.02 respectively [5,6].

S. N	Character	Variety			
		Safeda	Chausa	Langra	Deshi
1.	Weight (gm)	140.40	194.40	232	95.20
2	Length (cm)	9.55	13.10	11.34	14.10
3	Circumference (cm)	14.90	17.80	18.55	14.20
4	Specific gravity	1.01	1.02	1.02	1.02
5.	Waste (%)	20	15	15	25

The pulp showed pH value of each variety 3.0,3.5,2.5,2.5 respectively T.S.S., of mango pulp was 12^0Bx, 7^0Bx,6^0Bx, 7^0Bx. Acidity was observed 1.31%,0.56%,1.88%,1.88% as citric acid respectively . Ascorbic acid content was recorded 18.5mg/100gm, 17.0mg/100gm, 9.0mg/100gm, 25mg/100g respectively in which contribution of reducing sugar and non-reducing were found as 6.82and 1.15%, 5.46%and 0.32% 3.11and 0.79 **%**,3.18 and 1.06% as invert sugar respectively**.[7]**

The pH value at initial stage was found maximum (3.5) in safeda T_1,T_2,Chausa –T_2,T_4 and Deshi –T_2,T_4. While minimum(2.5) was found in Langra –T_1,T_3.After storage period of one month minimum pH value(2.5) was found in safeda-T_3,T_4 Chausa –T_1,T_3,Langra T_1&$T_2$and Deshi –T_1,T_3while maximum pH value (3.5) was found in Deshi T_2.

After storage period of three months pH value maximum (2.5)was observed in Safeda T_1,T_2,Chausa –T_2,T_4,Langra T_1,T_2 and T_4& Deshi –T_4,T_4. While minimum(2.0)was observed in safeda T_2,T_4,Chasua –T_1,T_3 and Deshi-T_1,T_3. Ph value was analyzed after six month storage period .The maximum pH (2.5)

was observed in Chausa –$T_2$and T_4,Langra –T_2&T_4,and Deshi –T_2&T_4.The acidity increased in all the sample of mango pickle .Acidity value at initial stage minimum 1.25% (as citric acid) was observed in Langra(T_2) while maximum (1.68%)was observed in Deshi T_4& Chausa T_3 respectively. During storage period of one month and three months acidity value was observed increased in all the treatments of each variety**.[8]**

S.N. Characters	Variety			
	Safeda	Chausa	Langra	Deshi
1 pH	3.00	3.50	2.50	2.50
2.T.S.S.(at 20^0c)	12.00	7.00	6.00	7.00
3.Acidity(%as citric acid)	1.31	0.56	1.88	1.88
4.Ascorbic acid (mg/100gm)	18.50	17.00	9.00	25.00
5.Reducing sugar(%)	6.82	5.46	3.11	3.18
6.Non Reducing Sugar(%)	1.15	0.32	0.79	1.06
7.Total sugar(%)	7.97	5.78	3.90	4.24

After storage period of 6 months acidity was observed increased in mango pickle . Data obtained at this stage maximum acidity value (2.60)% was observed in Deshi T_3. while minimum acidity value (1.95%) was observed in chausa T_2 and T_4**.[9]**

T.S.S. of mango pickle initially observed maximum (15^0Brix was observed in pickle prepared from safeda –T2 while minimum(7^0Brix)found in Chausa T1&T3,Langra T1&T3and Deshi T1. During storage of one month ,and three months it was found decreased in all the four treatments of each variety Lastly data obtained at 6 months of storage period maximum (13^0B) in safeda T4. While minimum (4^0B) was observed in Chausa –T_1&T_3 Langra T1&T3and Deshi T_1&T_3 respectively.

Ascorbic acid content in mango pickle at initial stage was observed maximum (13.60mg/100g) in Langra T_3&T_4. Ascorbic acid gradually decreased during one month and three months of storage period .Data obtained at 6 months of storage period .The maximum (7.85mg/100g) ascorbic acid Minimum 4.50mg/100 ascorbic acid was observed in chausa -T_2. Reducing sugar increased in all the treatments was observed during storage .

While non-reducing sugar contents was found decreased. The total sugar contents increased during storage the total sugar , found maximum(11.90%) was observed in safeda –T_4.While minimum (2.92%) was observed in chausa –T_1. After one month of storage period total sugar was found increased in all the four treatments of each variety. During storage period the chemical analysis showed an increasing trend of total sugar content in all the samples prepared under different treatment . At six months of storage period maximum (12.35%) total sugar content was observed in safeda T_4. While minimum (3.07%)was observed in chausa –T_1.

At initial stage salt percentage was observed (15%) in all the treatments. Obtained data shows continuous decrease in salt during storage period of one three months .At six month storage period salt percentage were varies between (12.30-12.50%) in the all four treatment of each variety. Cutout of mango pickle at different storage period for organoleptic evaluation and chemical analysis revealed that at the intial stage mango pickle prepared from Langra variety under unpeeled sour treatment (T_3) was found best among all the samples .while unpeeled sour pickle (T_1)prepared from Chausa variety was rated lowest .After one month storage period ,unpeeled sour pickle of Deshi variety was rated best among other samples . While lowest score have observed in peeled sour pickle (T_1) prepared from Chausa variety **.[10]**

Evaluation done after three months of storage period the maximum rating was confined to unpeeled sour pickle (T_3) prepared from Deshi variety of mango. While the lowest score has been observed in unpeeled sweet sour pickle (T_4) prepared from chausa variety. Evaluation done after six months of storage period the maximum rating observed in unpeeled sour pickle prepared from Deshi and Langra variety of mango. While minimum rating was observed in unpeeled sweet sour pickle (T4) prepared from chausa variety of mango.

Notes and References

State Institute of Food Processing Technology, 18- B, Ashok Marg, Lucknow-226001. (India).
Email:- *ramrakha1971@gmail.com*

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