The Pharma Innovation

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Studies on preparation of mango pickle and its organoleptic evaluation

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Abstract
An investigation was undertaken "studies on preparation on preparation of mango pickle and its organoleptic evolution" at the Post-Harvest Technology Laboratory, Department of Fruit Science, PGI, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2021 with the objectives to study the effect of mango genotypes and recipe on physico-chemical and sensory properties of mango pickle during storage and to find out the suitable genotype and recipe for quality mango pickle preparation. Four recipes of mango pickle i.e., Recipe-1, Recipe-2 (Recipe-1 + niger seed 150 g), Recipe-3 (Recipe-1 + garlic 200 g), and Recipe-4 (Recipe-1 + niger seed 150 g + garlic 200 g) and three genotypes (Galu, Shravanya and Telya) were standardized for preparation of mango pickle. The pickle samples were analyzed for different parameter *viz.*, appearance, aroma, texture, taste, and overall acceptability of mango pickle with advancement of storage period of 150 days. From the overall assessment of results obtained, mango pickle prepared by Genotype-3 (Telya) and by using Recipe-4 (Recipe-1 + niger seed 150 g + garlic 200 g) was found superior for preparation of mango pickle because in Recipe-4 all 16 spice ingredients are present rather than Recipe-1, Recipe-2 and Recipe-3.

Keywords: Mango pickle, recipe, genotypes, aroma, taste, texture, and overall acceptability

1. Introduction
Mango (*Mangifera indica* L) is the most important fruit of India and is known as "King of fruits". The fruit is cultivated in the largest area i.e., 2,312 thousand ha and the production are around 22.35 million tons and productivity are 7.3 MT/ha in India, contributing 40.48% of the total world production of mango. The main mango producing states in India are Uttar Pradesh, Andhra Pradesh, Maharashtra, Karnataka, Bihar and Gujarat. Rajasthan have highest productivity of mango in India (NHB Database 2018) [3]. World Scenario - Mango covers an area of 4,369 thousand ha with a production of 55.9 million tons. India occupies top position among mango growing countries of the world and produces 40.48% of the total world mango production. India has first rank and Indonesia and China stand second and third among mango producing countries (NHB Database 2018) [3]. Fruit is drupe, variable in form and size having thick or thin skin, leathery green, yellowish or red in colour. Unripe mango fruits due to their acidic taste are utilized for the culinary purpose as well as for the pickle preparation in India. Mango is a seasonal fruit, so quite a considerable portion of the fruits are processed for various products. Pickle is one of the oldest preserved products which is made from unripe mango. Mangoes have unique varieties that are only used for pickling and are rarely eaten as ripe fruit. The term pickle is derived from the Dutch word "Pekel" meaning brine Siddanna Rashmi (2010) [4]. Pickle is an edible product preserved in common salt, vinegar, & spices. Pickles are made from various fruits & vegetables like mango, lime, jackfruit, cauliflower, turnip, carrot & bamboo shoots. Among them mango pickle rank first and is mostly used throughout the country. Pickles are divided into four categories: vinegar pickles, citrus juice pickles, brine pickles and oil pickles. Besides from the basic fruit or vegetable, vinegar, sugar, salt, oil and spices are commonly added to pickles. Mango pickles have nutritional value about 78 calories, protein 0.2 g, carbohydrates 18.5 g, fibre 0.3 g and fat 0.4 g per tablespoon Tarla Dalal (2019) [5]. Mango pickle is loaded with vitamin C which helps to boost the immune system and improves absorption of iron. All three genotypes of mango are roundish in shape, pointed beak, pulp colour is whitish and whitish yellow, average weight of fruits about 200-270 g, pulp percentage is about 96.44 per cent and the peel thickness is about 13.2 mm Gahane *et al.*, (2019) [2].

2. Material and Methods

Mango fruits those are well matured and green colour with white flesh of three genotypes were selected from three different location of Akola which are grown for mango pickle preparation and all ingredients like sugar, salt, spices etc. were procured from the local market and brought to the Department of Fruit Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola and injured and diseased fruits were sorted out. The fruit were thoroughly cleaned, washed in water & were dried by wiping with muslin cloth. Four recipes for mango pickle were standardized with three genotypes. Pickle prepared by using different recipes were analyzed at 0, 30, 60, 90, 120 & 150 days for their physico chemical composition i.e. The sensory assessment of samples was done using the Hedonic rating test, Amerine et al., (1965) [1]. The sensory qualities of the samples were assessed based on colour, appearance, texture, taste, aroma and overall acceptability. The experiment was laid out in "Factorial completely randomized design" with two factors i.e., three genotypes (Galu, Shravanya, and Telya) and four recipes i.e., Recipe-1, Recipe-2 (Recipe-1 + niger seed 150 g), Recipe-3 (Recipe-1 + garlic 200 g), and Recipe-4 (Recipe1 + niger seed 150 g + garlic 200 g) and replicated thrice. Recipes details: Four recipes for mango pickle were standardized. Fruits of 1 kg were cut into small pieces of about 1 x 0.75 x 0.5 cm size.

2.1 Hedonic scale

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Like extremely - 9	Like very much - 8	Like moderately - 7
Like slightly - 6	Neither like nor dislike - 5	Dislike slightly - 4
Dislike moderately - 3	Dislike very much - 2	Dislike extremely - 1

Table 1: Different recipes of mango pickle

Sr. No.	Ingredients	Recipe I	Recipe II	Recipe III	Recipe IV
1.	Unripe mango flakes	1 kg	1 kg	1 kg	1 kg
2.	Oil(ml)	250	250	250	250
3.	Salt(g)	250	250	250	250
4.	Mustard dal(g)	100	100	100	100
5.	Clove(g)	10	10	10	10
6.	Black pepper(g)	10	10	10	10
7.	Cumin powder(g)	20	20	20	20
8.	Asafetida(g)	5	5	5	5
9.	Fennel(g)	100	100	100	100
10.	Cardamom(g)	5	5	5	5
11.	Fenugreek seed(g)	5	5	5	5
12	Chili powder(g)	20	20	20	20
13	Turmeric powder(g)	10	10	10	10
14.	Coriander powder(g)	20	20	20	20
15.	Niger seed(g)	--	150	-	150
16.	Garlic(g)	-	-	200	200

2.2 Procedure for pickle making

First sorted the selected mango. Thoroughly washed under tap water. Cleaned the mango fruits by cotton cloth and made required size flakes i.e., about 1 x 0.75 x 0.5 cm for pickle preparation. Dried the white flakes under the shadow for 3-4 hours. Till then prepared masala for the pickle. Heat the oil up to 60 ºC. Prepare the powder of fennel, clove, black pepper, and cardamom. Made the oil lukewarm and added the pickle ingredients viz., asafetida, fenugreek seeds, Niger seed coarse powder, chili powder, turmeric powder, salt, coriander, cumin and the powder of clove, black pepper, cardamom and mustard dal, garlic as per the recipes. Stirred and mixed it well. As the whole mixture is cooled down, immersed the mango pieces about 1 x 0.75 x 0.5 cm size of 1 kg fruits to it and mixed it well and stored it in dry earthen pot as per the treatments. Put the plate and covered the pot with muslin cloth and stored it at ambient temperature and in hygienic place. The earthen pots were stored at ambient temperature for evaluation of chemical changes and sensory qualities at 30 days interval during storage up to 150 days.
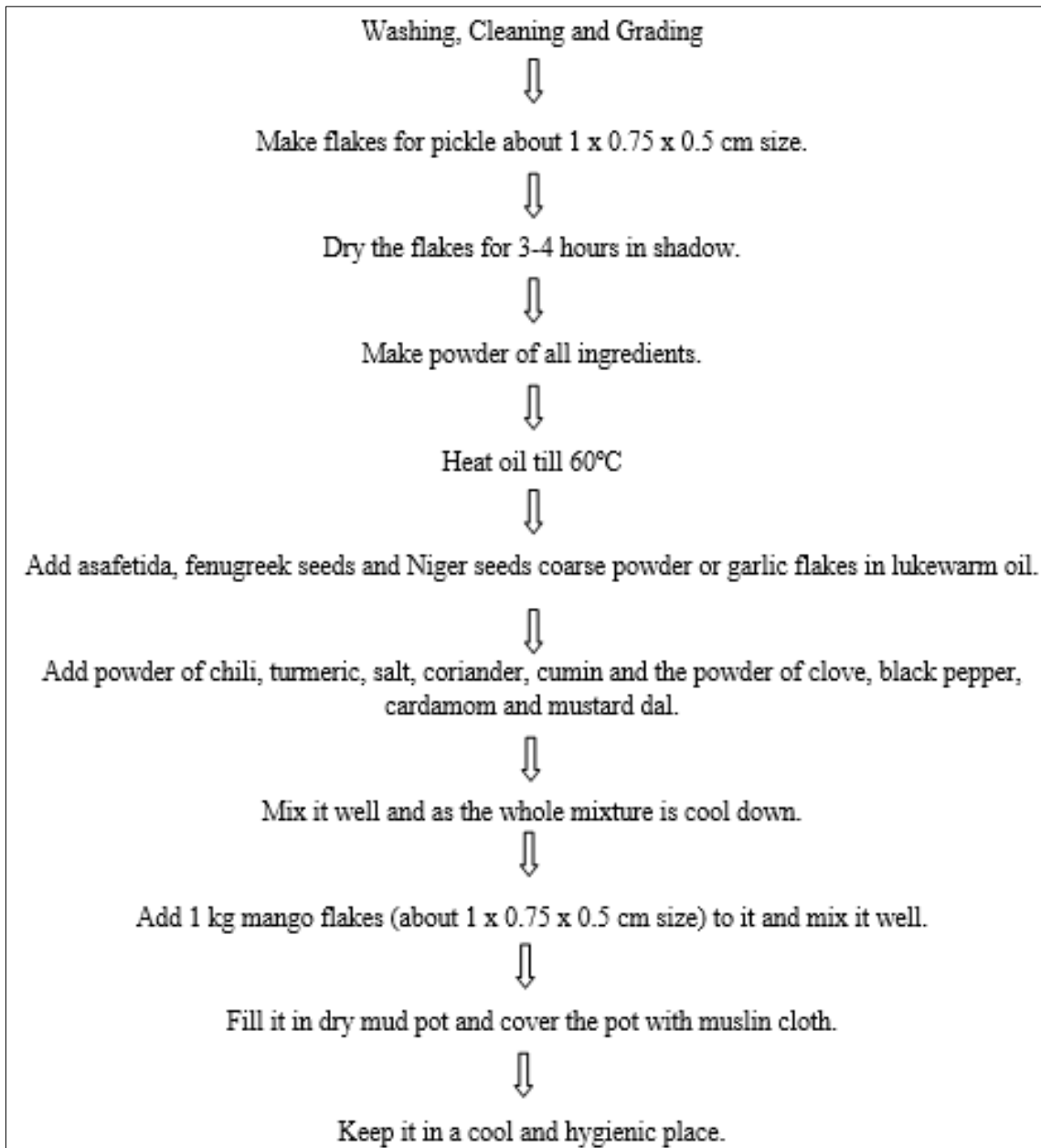
Flow chart 1: Flowchart of mango pickle preparation Selection of fruits for pickle

3. Results and Discussion
3.1 Appearance
The data in respect of appearance of mango pickle as influenced by different recipes was recorded up to 150 days of storage and presented in Table 2. The data exhibited that, the sensory score of appearance of mango pickle was decreased in all the treatments up to 150 days of storage. During sensory evaluation of mango pickle highest appearance score 8.5, 8.4, 8.2, 8 and 7.8 was recorded after 30th, 60th, 90th, 120th and 150th days of storage, by treatment combination of G3 (Telya) × Recipe-4 (Recipe-1 + niger seed 150 g + garlic 200 g) i.e., treatment T_{12}. While minimum appearance score 7.3, 7, 6.9, 6.7 and 6.4 was recorded by treatment combination of G1 (Galu) × R1.

3.2 Aroma
The data in respect of aroma of mango pickle as influenced by different recipes was recorded up to 150 days of storage and presented in Table 2. The aroma score of mango pickle was increased in the treatments. During sensory evaluation of mango pickle maximum score for aroma 7.5, 7.8, 8.1, 8.6, 8.7

was recorded after 30th, 60th, 90th, 120th and 150th days of storage, by treatment combination of G3 (Telya) × Recipe-4 (Recipe-1 + niger seed 150g + garlic 200g) i.e., treatment T_{12}. While minimum aroma score 6, 6.2, 6.5, 6.8 and 7.2 was recorded by treatment combination of G1 (Galu) × R1.

3.3 Taste
The data in respect of taste of mango pickle as influenced by different recipes was recorded up to 150 days of storage and presented in Table 2. The taste score of mango pickle was increased in all the treatments up to 150 days of storage. During sensory evaluation of mango pickle highest taste score 7.3, 7.5, 8.1, 8.5 and 8.6 was recorded combination of G3 (Telya) × Recipe-4 (Recipe-1 + niger seed 150g + garlic 200g) i.e., treatment T_{12}. While minimum taste score 5.8, 6, 6.6, 7 and 7.3 was recorded by treatment combination of G1 (Galu) × R1.

3.4 Texture
The data in respect of texture of mango pickle as influenced by different recipes was recorded up to 150 days of storage

and presented in Table 2. The texture score of mango pickle increased in all treatments. During sensory evaluation of mango pickle highest texture score 7.6, 8, 8.6, 8.7 and 8.8 was recorded after 30th, 60th, 90th, 120th and 150th days of storage, by treatment combination of G3 (Telya) × Recipe-4 (Recipe-1 + niger seed 150 g + garlic 200 g) i.e., treatment T12. While minimum texture score 5.9, 6.3, 6.8, 7 and 7.4 was recorded by treatment combination of G1 (Galu) × R1.

3.5 Overall acceptability
The data in respect of Overall acceptability of mango pickle as influenced by different recipes was recorded up to 150 days of storage and presented in Table 2. The overall acceptability score of mango pickle was increased continuously in all the treatments during 150 days of storage. During sensory evaluation of mango pickle highest overall acceptability score 8, 8, 8.5, 8.8 and 8.8 was recorded after 30th, 60th, 90th, 120th and 150th days of storage, by treatment combination of G-3 (Telya) × Recipe-4 (Recipe-1 + niger seed 150 g + garlic 200 g) i.e., treatment T12. While minimum overall acceptability score 6.7, 7, 7, 7.7 and 7.9 was recorded by treatment combination of G-1 (Galu) × Recipe-7.

Table 2: Interaction effect of different recipes on appearance, aroma, taste, texture and overall acceptability

Treatment combinations	Appearance			Aroma			Taste			Texture			Overall acceptability		
	Storage period (Days)														
	30th day	150th day	decrease in appearance	30th day	150th	Increase in aroma	30th day	150th day	Increase in taste	30th day	150th day	Increase texture	30th day	150th day	Increase in overall acceptability
G_1R_1	7.3	6.4	0.9	6.0	7.2	1.2	5.8	7.3	1.5	5.9	7.4	1.5	6.7	7.9	1.2
G_1R_2	7.6	6.8	0.8	6.3	7.6	1.3	6.1	7.6	1.5	6.2	7.7	1.5	7.0	8.2	1.2
G_1R_3	7.8	7.1	0.7	6.6	8.0	1.4	6.4	7.9	1.5	6.5	8.1	1.6	7.3	8.5	1.2
G_1R_4	8.3	7.4	0.9	7.1	8.5	1.4	6.7	8.2	1.5	7.1	8.5	1.4	7.4	8.4	1.0
G_2R_1	7.4	6.5	0.9	6.1	7.3	1.2	5.9	7.4	1.5	6.0	7.5	1.5	6.8	8.0	1.2
G_2R_2	7.7	6.9	0.8	6.4	7.7	1.3	6.2	7.7	1.5	6.3	7.8	1.5	7.1	8.3	1.2
G_2R_3	8.0	7.1	0.9	6.8	8.2	1.4	6.5	8.0	1.5	6.8	8.3	1.5	7.4	8.6	1.2
G_2R_4	8.4	7.7	0.7	7.2	8.6	1.4	7.0	8.4	1.4	7.4	8.7	1.3	7.6	8.5	0.9
G_3R_1	7.5	6.6	0.9	6.2	7.5	1.3	6.0	7.5	1.5	6.1	7.6	1.5	6.9	8.1	1.2
G_3R_2	7.7	7.0	0.7	6.5	7.9	1.5	6.3	7.8	1.5	6.4	8.0	1.6	7.2	8.4	1.2
G_3R_3	8.1	7.2	0.9	7.0	8.3	1.3	6.6	8.1	1.5	7.0	8.4	1.4	7.5	8.7	1.2
G_3R_4	8.5	7.8	0.7	7.5	8.7	1.2	7.3	8.6	1.3	7.6	8.8	1.2	8.0	8.8	0.8

4. Conclusion
On the basis of present findings it is concluded that the mango pickle prepared with different recipes combination of G3 (Telya) × Recipe-4 (Recipe-1 + niger seed 150g + garlic 200g) i.e., treatment T12 was found best after 150 days of storage in organoleptic scores for appearance, aroma, taste, texture and overall acceptability.

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