



Development and Evaluation of Soup Mix Utilizing Tomato Pomace Powder

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ABSTRACT

The utilization of the huge amount of food processing waste is pertinent to exploit its full potential. Mainly, it is used for feed purposes and efforts are needed to utilize them for food purposes as well, owing to their high nutritional status. The present work was done with the objective of utilizing tomato pomace which is edible and needs to be utilized in food products. An instant soup mix was developed with 0, 25, 50 and 75 per cent addition of tomato pomace powder in the formulation. The sensory analysis results show that the soup having 50per cent of tomato pomace powder has the maximum acceptability and it shows good shelf life stability for three months in laminated packets when stored at room temperature. The product is convenient to make and will help in effectively utilizing this important by-product and reduce wastage.

Key Words: Tomato, Pomace, Powder, By-Product, Utilization, Instant , Soup Mix, Convenient Food.

INTRODUCTION

The huge amount of food processing waste is the matter of great concern in the present times. Tomato is a major crop of Punjab and is grown on an area of 10.27 thousand hectare with the production of 256.87 thousand MT in a year (Anon 2020). It is also among the most processed crops and is used to get juice, paste, ketchup, powder, etc. (Bathla *et al*, 2019; Bhuyan *et al*,, 2019). The processing of tomatoes results in the generation of 2-5per cent of tomato pomace (Zuorro *et al*, 2011). It consists of seed, peel and residual pulp and as the whole tomato is edible, this byproduct also can be utilized for food purposes. This byproduct is a rich source of nutrients and has been utilized for food uses as observed by the work of various researches (Majzoobi *et al*, 2011; Dhungana *et al*, 2011; Privetera *et al*, 2016; Rehal *et al*, 2021). The tomato pomace is very perishable due to the high amount of water and nutrients present in it and spoil very quickly due to microbial growth. Moreover, the disposal of such waste poses severe pollution problems and a drain on the resources. Keeping

this into the consideration, the present study was conducted to develop an instant soup mix with the aim to maximize utilization of tomato pomace and to study its shelf life.

MATERIALS AND METHODS

The study was conducted in the department of Food Science and Technology, PAU, Ludhiana in year 2021. Tomato pomace was obtained from the Food Industry Business Incubation center, PAU, Ludhiana. It was immediately dried in a tray drier at 50°C± 2°C for 48 hours. It was further milled in a mixer, sieved and packed in polyethylene bag and stored at 4°C till further use. Other ingredients for the preparation of soup and its packaging (LDPE and laminated packets) were procured from the local market. The formulation of the instant soup mix in varying proportion is given in Table 1.

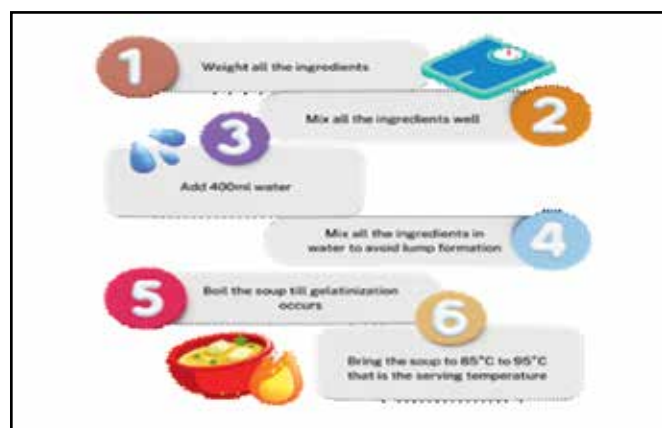
The soup mixes with all treatments were prepared by weighing all the ingredients according to table 1 followed by mixing them well. They were stored in LDPE packets and laminated packets and stored at room temperature for a period of three

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Table 1. Material used in the various treatments of instant soup mix.

Raw material	Treatments			
	T1	T2	T3	T4
Tomato pomace	0.0g	5.0g	10.0g	15.0g
Corn starch	20.0g	15.0g	10.0g	5.0g
Salt	3.0g	3.0g	3.0g	3.0g
Cumin	0.2g	0.2g	0.2g	0.2g
Coriander	0.2g	0.2g	0.2g	0.2g
Black pepper	0.05g	0.05g	0.05g	0.05g
Red chilli	0.1g	0.1g	0.1g	0.1g
Ginger and garlic powder	0.3g	0.3g	0.3g	0.3g
Onion powder	0.1g	0.1g	0.1g	0.1g
Water	400ml	400ml	400ml	400ml

months for conducting the storage studies. For conducting the sensory analysis, each treatment was taken and, 400ml water was measured. All the ingredients were mixed in cold water completely to avoid lump formation. The mixture was then boiled till gelatinization occurred. The soups were served hot at the serving temperature of 85- 90°C for further sensory analysis. The flow diagram for the soup preparation is given in Fig. 1.

**Fig 1: Pictorial depiction of preparation of instant soup**

Sensory evaluation was carried out by a semi-trained panel on a 9-point Hedonic scale to check its acceptability. The panelists were faculty members and post-graduate students of the department of

Food Science and Technology, PAU, Ludhiana and were familiar with the process of sensory evaluation test. The sensory tests were conducted with a two hours gap from the last meal eaten by the panelists and water was provided for rinsing of mouth in between each sample. (Hedonic scale: 9-like extremely, 8-like very much, 7-like moderately, 6-like slightly, 5-neither like nor dislike, 4-dislike slightly, 3-dislike moderately, 2-dislike very much, 1-dislike extremely)

The moisture content and free fatty acid content was determined to know about the shelf life of the soup mix and were estimated using method from AOAC (2016). For free fatty acid, a 5 g sample was taken in flask and 50ml benzene was incorporated to it. Mixture kept for 30 minutes. In order to measure the FFA content, 5ml of extract was taken, followed by addition of 5ml benzene and 10ml alcohol. Phenolphthalein was used as indicator, titrated against 0.02N KOH till persistence of light pink color for 15 sec. The results were reported in per cent oleic acid. Statistical analysis was done to find the mean and standard deviation for the various variables. Data was analysed as per one factor analysis of variance (ANOVA) using LSD of AgRes software statistical package.

Table 2. Sensory Analysis scores of the various formulations of instant soup mix.

Sample	Appearance/ color	Flavor	Taste	Texture	Overall acceptability
T1 (Control)	7.20 ± 0.41 ^d	7.11 ± 0.21 ^d	7.00 ± 0.34 ^c	7.32 ± 0.23 ^c	7.16 ± 0.42 ^c
T2 (25%)	7.51 ± 0.32 ^c	7.54 ± 0.11 ^c	7.54 ± 0.23 ^b	7.50 ± 0.21 ^b	7.52 ± 0.31 ^{ab}
T3 (50%)	8.00 ± 0.34 ^b	8.14 ± 0.33 ^a	9.00 ± 0.11 ^a	8.04 ± 0.32 ^a	8.30 ± 0.34 ^a
T4 (75%)	8.20 ± 0.32 ^a	7.80 ± 0.12 ^b	6.78 ± 0.32 ^d	7.22 ± 0.31 ^c	7.50 ± 0.22 ^b
Comments	T1- Too Thick T2- Tomato flavor was less pronounced, bland T3- More like a tomato soup and the texture and thickness was best T4- Tomato flavor more pronounced but it was a little bitter in taste and less thick				

Values are mean ± SD, n = 15; values within a column with different superscripts are significantly different ($p \leq 0.05$)

RESULTS AND DISCUSSION

The result of the sensory analysis (Table 2) shows the scores of the instant soup mix prepared with addition of tomato pomace at varying levels (0, 25, 50 and 75 %). It was noticed that the incorporation of tomato pomace powder had a profound effect on all the sensory parameters of the instant soup mix. The scores for appearance show a significant increase with the increasing concentration of pomace due to the presence of lycopene in the tomato pomace powder and hence the control sample T1 obtained least scores for appearance. Scores for flavour and taste show an increase up to 50per cent addition of tomato pomace and beyond that a significant decrease was observed in the scores. The sour taste of the tomato pomace was not acceptable beyond 50per cent replacement and the slight bitterness was also reported by the panellists. Tomic *et al* (2016) reported that a substitution level of more than 25per cent with tomato pomace powder caused a higher degree of cookie softening and a more pronounced flavour in the cookies. In case of texture, the addition up to 50per cent was optimum for obtaining best texture and mouth feel. Treatment T4 had a runny texture which was not preferred by the panel members. The elevated amount of fibre in the pomace and a resultant decrease in the starch component in the

mix might be the reason for the poor texture of T4 treatment soup. Treatment T3 with 50per cent of supplementation shows a statistically better score for overall acceptability and hence was selected for further studies.

Storage study of the instant soup mix was done by packaging the final selected formulation T3 in LDPE and laminated pouches and storing at room temperature. Free fatty acids are a result of hydrolytic rather than oxidative rancidity and are used as an indicator of storage stability of the foods. The free fatty acid content of the soup mix showed a constant increase till three month of storage studies, more so in the mix kept in LDPE packets and significantly less in the mix stored in laminated pouches. The elimination of light from the laminated pouches helps in keeping the free fatty acid content at a lower level as the presence of light, air and moisture accelerates the oxidation process and hence development of rancidity (Henry, 2016).

The moisture content of the stored samples also showed a similar trend and increased significantly in both the packaging materials. The gain in moisture was more in the LDPE packets as compared to the one stored in laminated packets. As high moisture content is a factor for the growth of microorganisms so it should be kept under control. Hence, based on

Table 3. Shelf life studies of the instant soup mix.

Parameter	Storage day	Laminated packets	LDPE packets
Free fatty acids (% oleic acid)	0	0.42±0.01 ^a	0.42±0.01 ^a
	30	0.59±0.03 ^b	0.62±0.02 ^a
	60	0.72±0.03 ^a	0.76±0.03 ^a
	90	0.81±0.02 ^b	0.97±0.03 ^a
Moisture (%)	0	5.44±0.24 ^a	5.44±0.24 ^a
	30	5.57±0.25 ^a	5.52±0.21 ^a
	60	5.75±0.33 ^b	5.81±0.32 ^a
	90	5.86±0.35 ^b	6.12±0.36 ^a

Values are mean ± SD, n = 15; values within a row with different superscripts are significantly different ($p \leq 0.05$)

the results it was recommended to pack the soup mix in laminated packets for better storability.

CONCLUSION

A very acceptable instant soup mix can be obtained by utilizing 50 per cent of tomato pomace powder which has high overall acceptability and exhibited a good shelf life of three months of the storage study. The product can have a more shelf life as the parameters studied were well in the acceptable range for the three months of study period and further studies are needed to corroborate this.

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