Plant Archives Vol. 20, Supplement 2, 2020 pp. 2769-2780 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

AN OVERVIEW OF PREPARATION, CONSUMPTION PATTERN AND QUALITY ATTRIBUTES OF GHEWAR: A TRADITIONAL SWEET OF HARYANA, INDIA

Varun Batra[a], Vikas Kumar[b], Jaspreet Kaur[a]*, Rasane Prasad[a], Yogesh Gat[a], Sheenam Suri[a]
[a]Department of Food Technology and Nutrition, School of Agriculture, Lovely Professional University, Phagwara, Punjab-144411, India
[b]Department of Food Science and Technology, Punjab Agricultural University, Ludhiana, Punjab-141004, India.

Abstract

Ghewar, a traditional Indian sweet, prepared from refined wheat flour and deep fat fried has honey-comb structure, porous texture and sweetened with sugar syrup. It is famous in northern region of India and given as a token of gift in the rainy season festivals like teej, rakshabandhan, janmashtami etc. A survey was conducted on ghewar, manufacturing process opted by different sweetmeat shops (n=14) to explore this product and reported with the help of a questionnaire (a pre-tested, non-disguised and open-ended question). From the survey, it was revealed that the basic raw materials used in the ghewar production are refined wheat flour, sugar, clarified butter, water, milk and several toppings (such as cardamom, cashews, almonds and raisins). Ghewar prepared are of circular shape having weight of about 260-280g/piece and utilized as a sweet and gift; and packed in food grade LDPE as primary packaging and colourful cardboard box as secondary packaging which have a shelf life of about 7-9 days. The physico-chemical composition of the product varied widely among the different collected samples and was confirmed with the FTIR analysis of the samples too by the variation in the area and presence of new peaks. Due to seasonal and geographically availability only, valuable research could be gained through this survey.
Keywords: Ghewar, survey, syrup, honey-comb structure, traditional food.

Introduction

Traditional foods are the foods and dishes generally accepted by people of the same culture. These products are traditionally consumed and distributed on various festive and occasions. Traditional Indian products include various innovative blends of ingredients having the nutraceutical potential and aesthetic appeal. Traditional foods also have its own socio-cultural meanings, processing technologies, uses, composition and the nutritional values (Kuhnlein *et al*., 1996; Kumar and Dwivedi 2018a; Kumar *et al*., 2018b; Kumar *et al*., 2018c; Kumar and Dwivedi, 2018d; Kumar *et al*., 2018e; Kumar and Pathak, 2019f; Kumar *et al*., 2019g; Siddique and Kumar, 2018h; Siddique *et al*., 2018i). A significant change has been observed in food habits in India over the last decades and responsible for the consequences for food and nutrition security (Deaton *et al*., 2009). Traditional foods (fermented and non-fermented) have many nutritional benefits that make them superior (Johnson *et al*., 2009; Kumar *et al*., 2019). They are rich in many nutrients and contain more heart healthy fats than many non-traditional foods (Johnson *et al*., 2009). India is well known for its diversity, which ranges over their cultures and food habits. Indians are possessing the traditional culture where finest cuisines being offered for relatives and others on the different occasions. Such cuisines are prepared and consumed traditionally and have their own ethnicity (Pathak *et al*., 2017j; Prakash and Kumar, 2017k; Kumar and Mandal, 2014L; Kumar *et al*., 2014m; Kumar *et al*., 2014n; Kumar, 2013o; Kumar and Dwivedi, 2015p; Gogia *et al*., 2014q).

The demand of the type and nature of the traditional food varied as per the location and tribe in India. Different states of India (Punjab, Haryana and Rajasthan) have been known for its simple and traditional food habits. People of these states have a sweet tooth and thus it gives many traditional sweets to people such as ladoo, halwa, kheer, churma, balushahi, ghewar (Kumar, 2014r; Kumar *et al*., 2012s; Mishra *et al*., 2012t; Kumar *et al*., 2011u; Kumar *et al*., 2011v; Kumar and Pathak, 2016w; Pathak *et al*., 2016x; Kumar *et al*., 2018y; Kumar *et al*., 2018z.). Among these, 'ghewar' (Figure 1) has a religious significance and constitutes an integral part in various rituals like during the teej, rakshabandhan and janmashtami festival. It is prepared by the deep-fat-frying method and is particularly restricted to a monsoon season (July–August). The softness of the ghewar crumb is due to absorbance of moisture from environment. The moisture that ghewar batter absorbs from the recipe and from the humid environment of rainy season is essential in giving it a good rise. The batter for making ghewar should be of thin running consistency (high moisture) so that it is easier to pour continuously in thin stream. First showers of rainy season and humid environment help in achieving the desirable uniform porous texture ("jaali"). Porous texture is due to the leavening effect of steam which gives it a honey-comb structure. The steam is the only leavening agent in ghewar, so it is also called steam leavened cake. The temperature of oil is considered as an important factor in frying of ghewar (Kumar *et al*., 2018aa; Kumar *et al*., 2018bb; Kumar *et al*., 2018cc; Kumar and Dwivedi, 2018gg; Kumar *et al*., 2018ff; Kumar *et al*., 2018cd; Kumar and Pathak, 2018kk; Kumar and Pathak, 2018pq; Singh *et al.,* 2020a; Singh *et al*., 2020b; Sood *et al*., 2020; Bhadrecha *et al.,* 2020; Singh *et al*., 2020c; Sharma *et al*., 2020; Singh *et al*., 2020d; Bhati *et al*., 2020; Singh *et al*., 2019; Sharma *et al*., 2019). Frying temperature should be around 165□C and sugar syrup that should be used for sweeten the ghewar should be of single thread consistency (around 50 degree Brix). It was served either plain or garnished with pistachio, cardamom powder and other dry fruits. It is too evolved from being the plain mouthful to being dressed with sweet

condensed milk and mawa on the top. Nutricereals such millet and oats can also be incorporated in the preparation of ghewar as they are rich in both macronutrients as well as micronutrients (Kumar *et al*., 2018; Kumar *et al*., 2020). Oats help in enhancing the functional and nutritional value of food products (Rasane *et al*., 2015). Numerous products have been developed by using millet flour owing to its nutritional characteristics (Joshi *et al*., 2015).

Fig. 1 : Ghewar

Till date, the product is produced at local sweet shops only and available in a very limited region for the limited time. The technology of its production as well as the raw material is not explored still might be because of the different methods of its preparation as well as the diversity of the ingredients (raw material). This whole should be explored in such a way to exploit the product as well as its traditional technology of production. Therefore, present study is planned to explore and document its preparation, consumption pattern and nutritional profile.

Materials and Methods

Assessment of Ghewar production technology through survey

To conduct the survey, a pre-tested, non-disguised questionnaire was prepared. Majority of the questions were kept open-ended to gather maximum information from the selected respondents (n=14) of two cities (Sonepat and Gohana) of Haryana, India. Personal visits were made to the different shops of the above surveyed location and the information was collected by personal interactions with several workers, people involved in preparation (halwai) and shopkeepers to collect the information of the various aspects of ghewar including ingredients, equipment, adjuncts and additives used; socio-cultural importance and consumption pattern. They were also questioned for the different parameters such as shelf life and physical characteristics (colour, shape, size and weight). Based on the information collected by the survey, a general flow sheet of the manufacturing process was developed. The data was classified according to the shops and compiled. The collected samples (n=14) from the different locations were brought to the lab and were analysed for various physico-chemical attributes.

Physico-chemical analysis

Total soluble solids and ash content were estimated by following the standard methods as described by AOAC (2006). The moisture content of different samples was determined by drying to constant weight in an oven at 105±2^{o}C. The nitrogen content was estimated by Kjeldhal method (AOAC, 2006; Handa *et al*., 2017). Protein content was calculated as nitrogen×6.25. Protein content was calculated as nitrogen×6.25. Starch (630 nm), total sugar (490 nm) and reducing sugars (620 nm) were determined calorimetrically by the anthrone reagent method, phenol sulphuric method and Nelson-Somogyi's method respectively (Sadasivam and Manickam 2004). Total phenols (650 nm) were determined using standard procedure using Folin-Ciocalteau reagent as described by Sadasivam and Manickam (2004). Antioxidant activity (Free radical scavenging activity) was measured as per the standard method given by Brand-Williams *et al*. (1995) using DPPH and was expressed as percent inhibition (Kumar *et al*., 2017). Fat content, lactose content and total carotene content were estimated using method mentioned by Ranganna (2009). Free fatty acids, as oleic acid percentage, in ghewar samples were determined using an alkali titration method, whereas peroxide value (meq/kg) was measured by titration with 0.1 N sodium thiosulphate, using starch as indicator (AOAC 2006). Estimation of 5-hydroxymethylfurfural (HMF) were carried out using method mentioned by Rattanathanalerk *et al*., (2005).

FTIR analysis

Different samples (n=6) of ghewar were subjected to FT-IR analysis (Shimadzu 8400S FT-IR spectrometer, equipped with KBr beam splitter) using approximately 5 mg of each sample along with 5 mg KBr for qualitative analysis. FT-IR spectrophotometer was operated at a spectral range of 4000–400 cm^{-1} with a maximum resolution of -0.85 cm^{-1}. The spectra were interpreted using the guidelines of Stuart (2004).

Statistical analysis

Data obtained from the physico-chemical analysis were analyzed by using GraphPad Prism (V.5.01, La Jolla, CA, USA) software. Results were expressed as Means ± SEM. Cluster analysis of the data was performed to get a comprehensive overview of physico-chemical and functional properties of ghewar by using SPSS 16.0 software.

Results and discussion

Results of the survey revealed information regarding the raw materials, manufacturing process and the consumption pattern of ghewar. The related information collected was further compiled, processed and explained in this section under different sub-headings in the subsequent section.

Raw materials (used for Ghewar production)

During the survey study, it was revealed that the adjuncts used in ghewar varied from shop-to-shop. The raw material mainly used was refined wheat flour and it had known as maida locally. Survey showed that the additives like cardamom, cashews, kesar, almonds, raisins, pistachio, mawa, condensed milk and milk cream varied depending upon the location and consumer preferences. Mawa is a dairy product that is made of either dried whole milk or milk thickened by heating in an open iron pan. The survey also revealed that no standard recipe and methods were applied on different shops for the ghewar manufacturing; however, the process was almost the same. The main difference was found in the use of adjuncts and their ratio. A complete data of the raw material along with adjuncts are present in Table 1.

Manufacturing process

The sweets shops use the ghewar ring to produce the ghewar in a circular shape. It is a tall metallic ring that is usually 5 inches high as depicted in Figure 2. The diameter of the ring decides the diameter of the ghewar and this ring is placed inside a pot full of fat and the batter is dropped in thin stream in the centre of tube to make ghewars (Bali, 2011).

Fig. 2: Ghewar making equipments

Ghewar is prepared by a deep fat frying method. Fats are emulsified by rubbing it with ice and converted into melted fat (Saxena *et al*., 1996). Then, batter is made by combining refined wheat flour, clarified butter and ice cold water and made it into a thin pouring consistency. Then, batter is poured in a form of thin stream into a tall ring that is placed inside the pan containing the hot ghee and the moisture present in the batter turns into steam and evaporates out leaving larger holes in the resulting flat disc like structure with raised edges. When batter temperature reached water evaporation temperature, steam left the hard porous texture structure behind. So, it also called steam leavened cake. Then, it is removed into a wired rack to remove excess of fat and syrup is poured over it. It can also be garnished with toppings like rabri, condensed milk, mawa, nuts and saffron for additional flavour. By having an interaction with the respondents, a generalized process for ghewar preparation was made depicted in Figure 3. However, it was observed that all the shops adopted a particular method for the preparation of ghewar. There is not so much change in the ghewar preparation process. The pictorial view of the ghewar preparation process is depicted in Figure 4.

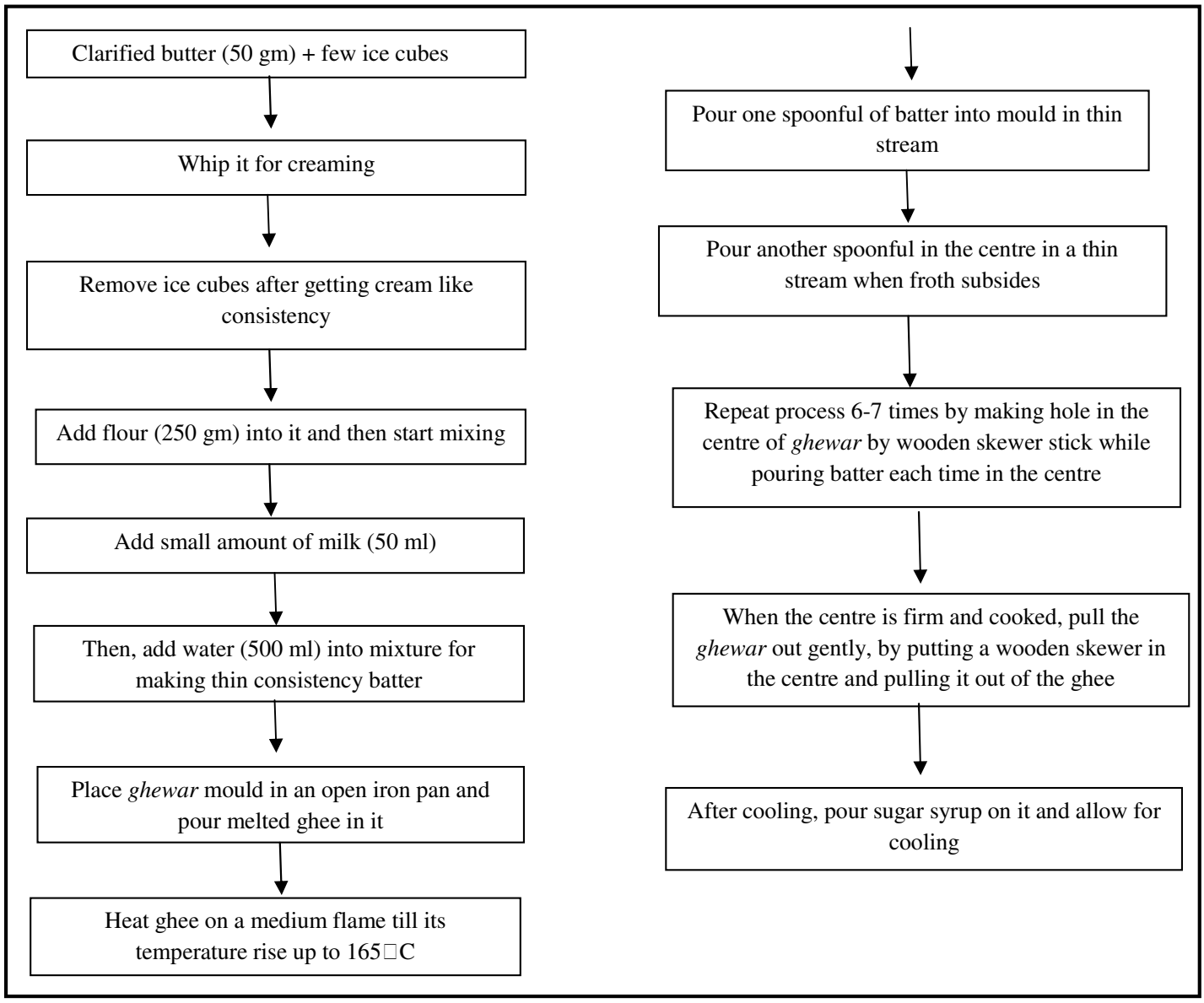


Fig. 3: Generalized process for the Ghewar preparation as per the information gathered from various shops

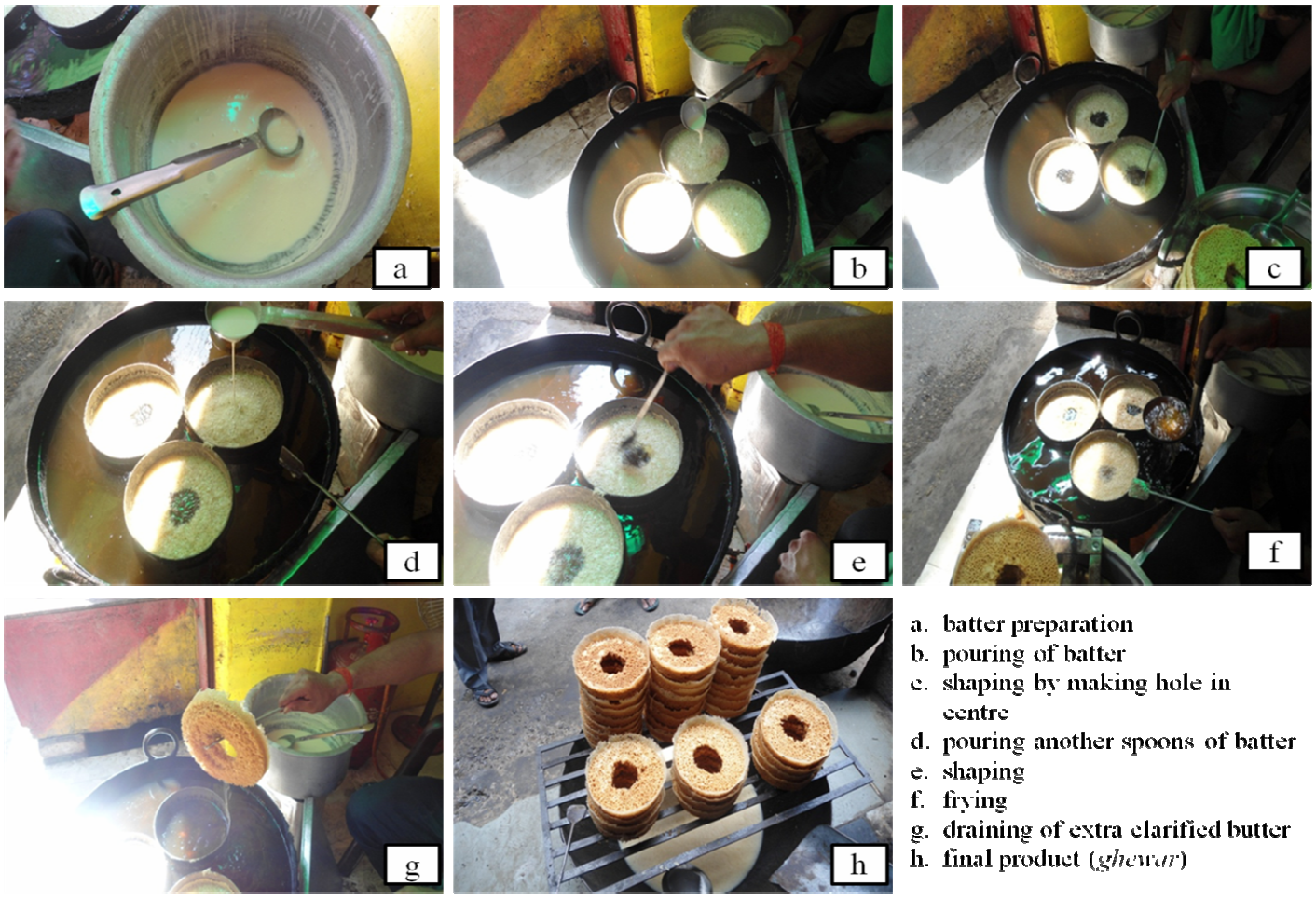


Fig. 4: Ghewar preparation process

Physical characteristics

Table 1 and 2 gives the information regarding the physical characteristics of ghewar such as its colour, shape, size and weight. It was observed that white and light brown colour ghewar were produced by almost all shops and very few shops produce yellow colour ghewar with addition of kesar (Saffron). The information given by survey also reveals that all of the shops produce circular shaped ghewar. From the Table 2, it was observed that most of the shops produce ghewar in the dimensions having a height of about 1.8-2.0 cm and radius of about 6.0-7.2 cm. Some people also used a mawa (partial dehydrated whole milk product) as a topping in ghewar. Table 2 also gives the information regarding the weight range of ghewar. It was observed that weight of simple ghewar in the range of about 260-280 g/piece were prepared most by the shops and mawa ghewar in the range of about 420-440 g/piece.

Table 1: List of the raw materials, physical characteristics, utilization and packaging material of ghewar

Parameters	Components	Remarks
Raw materials	Refined wheat flour, clarified butter, ice, sugar, water, milk, cardamom, cashews, almonds, raisins, kesar, pistachio, condensed milk, mawa, milk cream	The mainly used raw materials are refined wheat flour, clarified butter, sugar and water. Rest of the raw materials used according to shops.
Physical characteristics	Colour White Light brown Yellow Shape Circular	Most of the shops make white colour and circular shape ghewar.
Utilization	Sweet Gift	Almost all people consume ghewar as a sweet and some utilized it as a gift on occasion of teej, rakshabandhan, janmashtami.
Packaging material	Primary- LDPE Secondary- cardboard box Tertiary- Polyethylene bag	Almost everywhere, ghewar is packed in colourful cardboard box for gift packs and some use the polythene bags as a packaging material.

Table 2: Size and weight range of Ghewar of different shops with intensity.

Size (cm)/piece			
Height	**Intensity (n=14)**	**Radius**	**Intensity (n=14)**
1.0-1.2	7.14	6.0-6.4	35.71
1.2-1.4	14.28	6.4-6.8	21.42
1.4-1.6	28.57	6.8-7.2	35.71
1.6-1.8	7.14	7.2-7.6	0
1.8-2.0	42.85	7.6-8.0	7.14
Weight (gm)/piece			
Simple Ghewar	**Intensity (n=14)**	**Mawa based Ghewar**	**Intensity (n=14)**
220-240	7.14	400-420	14.28
240-260	21.42	420-440	28.57
260-280	35.71	440-460	21.42
280-300	21.42	460-480	21.42
300-320	14.28	480-500	14.28

Consumption and utilization of ghewar

The consumption pattern of ghewar and about its packaging material is summarised in Table 1. The ghewar is mainly consumed as a sweet and some used it as a gift also due to its high ethnicity value. It is given as a gift along with other gifts such as suhali (sweet jaggery product) in a traditional gift box to the married daughter during the rainy season. It was surveyed that, almost all the shops use coloured cardboard box as a packaging material for ghewar and some use polyethylene bags too. The information collected from the ghewar manufacturers and consumers showed that the shelf–life of their product varied from 7-9 days for simple ghewar and 3 days for about mawa ghewar (Table 3).

Table 3: Shelf life (in days) of Ghewar samples of different shops

Shelf life (Days)			
Simple Ghewar	**Intensity (n=14)**	**Mawa based Ghewar**	**Intensity (n=14)**
7-9	35.71	1	0
9-11	21.42	2	0
11-13	21.42	3	71.42
13-15	14.28	4	14.28
15-17	7.14	5	14.28

Ghewar is very popular during the time of monsoon that every family waiting for any relative to arrive has only wish that they will bring "ghewar" with them and if they bought Sonepat's ghewar with them, it's a special treat by the visitor. Earlier years ago, it used to be only plain white ghewar, but now there are also different flavours coming such as kesar and rabdi filled ghewar. No interest is seen in other sweets by the customers during this season. From the aspiring information provided by the shop keepers, it was concluded that 'Just as the mango is the king of fruits, the ghewar is considered as the king of sweets' during rainy season.

Physico-chemical analysis

The collected ghewar samples from the different sweets shops were analysed for physico-chemical characteristics like moisture, ash, fat, reducing sugars, total sugars, total phenols, antioxidant activity, starch, lactose, carotenoids, total soluble solids (TSS), proteins, free fatty acids (FFA), peroxide value and 5-hydroxymethylfurfural (HMF) and their range are presented in table 4. The results regarding the moisture, reducing and total sugar, ash proteins, fats, free fatty acid and peroxide value were inline with the findings of Saxena *et al.* (Saxena *et al.*, 1996).

Table 4: Range of various physico-chemical analysis parameters of collected Ghewar samples

Parameters	Range	Parameters	Range
Moisture (%)	9.2±0.28– 10.4±0.23	Lactose content (%)	1.38±0.08-2.29±0.45
Total ash (%)	0.27±0.01-0.31±0.02	Total cartenoids (mg/100gm)	0.034±0.05-0.134±0.01
Fat (%)	35.6±4.91-51.4±7.99	TSS (B)	35±7.64-60±7.07
Reducing sugars (%)	2.84±0.16-4.72±0.93	Proteins (N × 6.25) (%)	2.8±0.32-4.1±0.49
Total sugars (%)	34.11±1.22-39.68±1.74	Free fatty acids (%)	0.15±0.03-0.21±0.02
Phenols (mg/100ml)	31.13±4.94-72.87±5.87	Peroxide value (milli equiv. O_2/kg oil)	6.3±0.40-8.4±0.62
Antioxidant activity(%)	22.35±5.71-74.97±6.92	5-Hydroxy methyl furfural (moles/100g)	0.17±1.00-6.30±3.18
Starch content (%)	25.56±1.42-32.54±2.74		

Cluster and FT-IR analysis of the collected samples (T_1-T_6: coded values)

The overall physico-chemical analysis data obtained from analysis of ghewar samples from different shops was analysed using rescaled distance cluster analysis (Figure 5). It is evident from the figure that there was formation of the two main clusters where the first cluster consist of all the collected samples under study except T_6 (mawa based ghewar) indicating that almost all the samples were similar in physico-chemical attributes except T_6. A further clustering of the 1st cluster indicated that there was further formation of two sub clusters having T_1 and T_3 in close relation, whereas, T_2, T_4, T_5 were found to be interrelated. The same results were also observed while the FTIR analysis of the data (Table 5). The variation in the area of peak (Figure 6a-6f) as well as presence and absence of peak indicating the functional groups (Table 5) might be due to the different proportion of the raw material used for the preparation of ghewar samples.

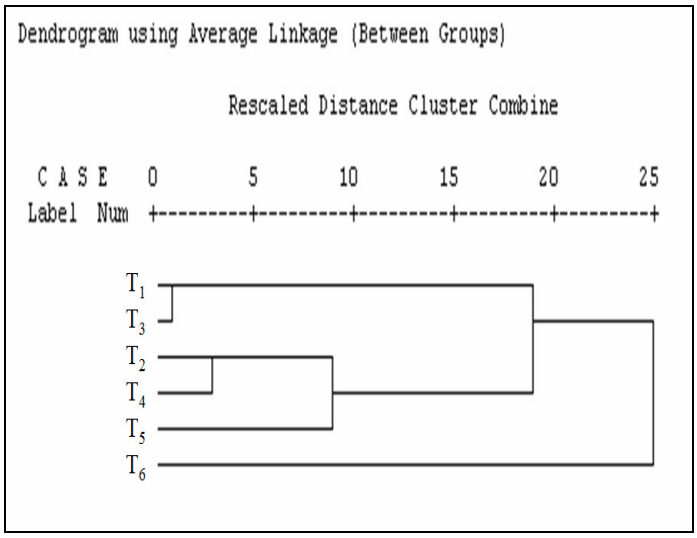


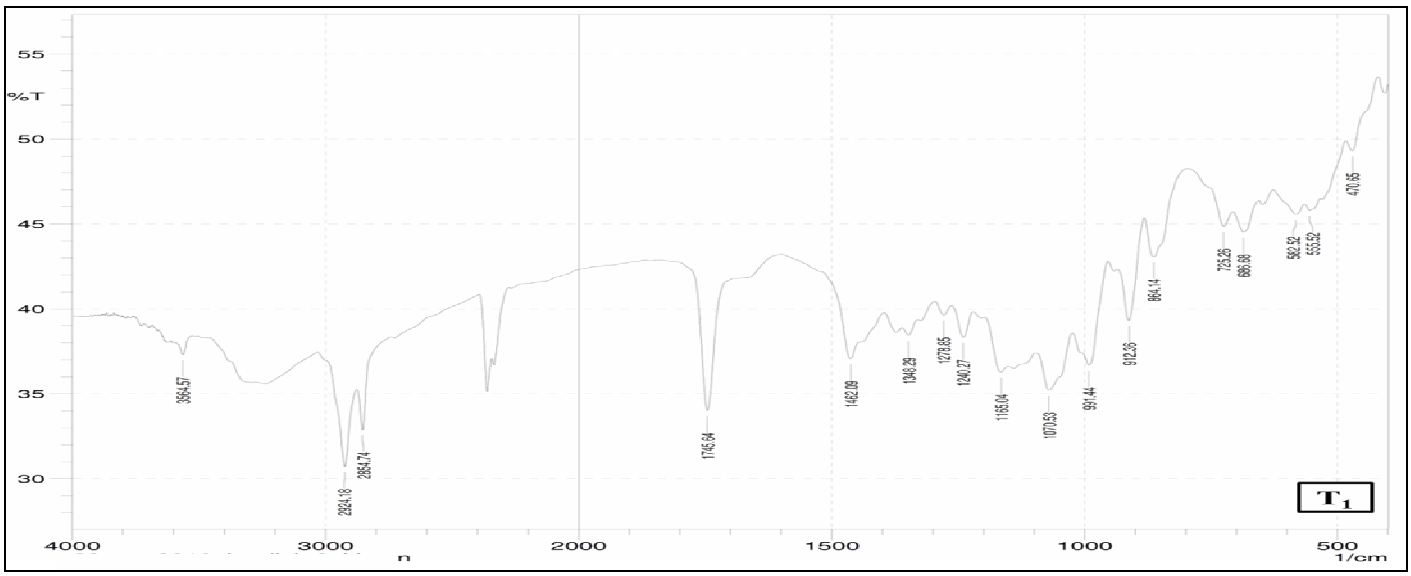
Fig. 5: Dendrogram of different collected samples using different physico-chemical characteristics analysed based on rescaled distance (T_1 to T_6: samples from different shops).

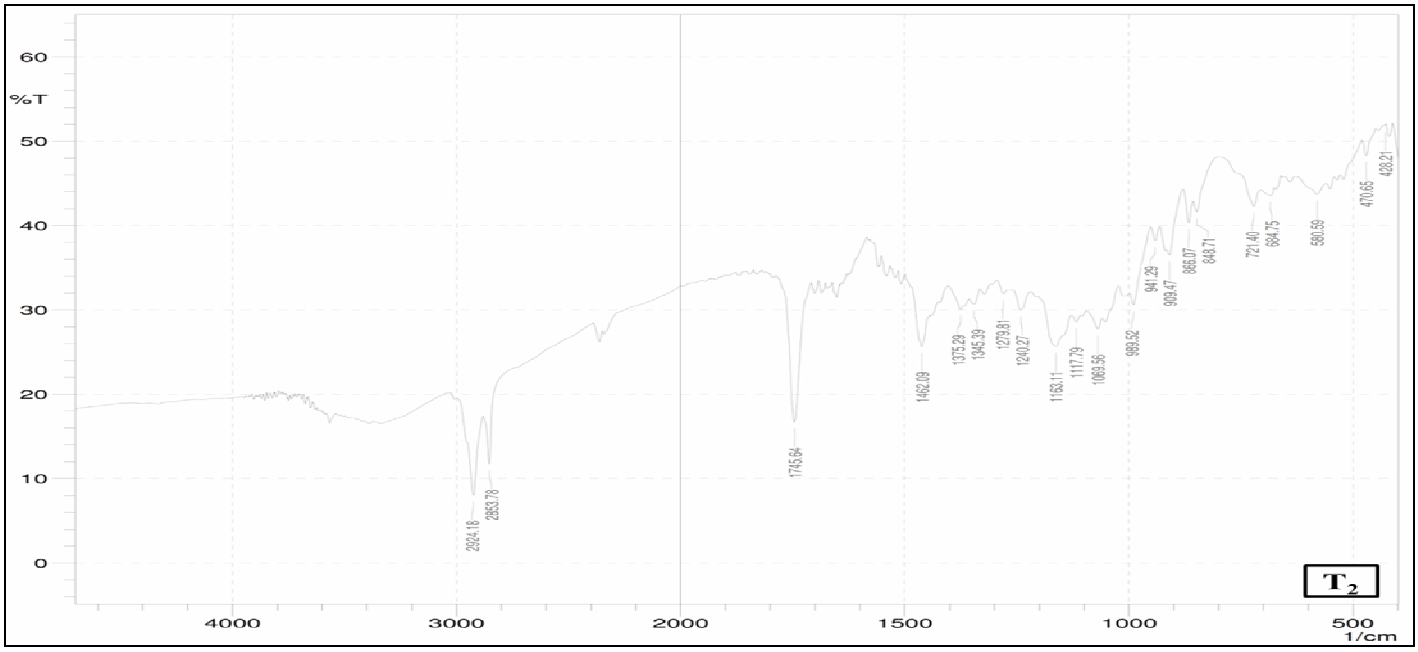
Table 5: FTIR spectra of the different ghewar samples

T1*			T2			T3			T4			T5			T6		
Peak	Area	Compound	Peak	Area	Compound	Peak	Area	Compound	Peak	Area	Compound	Peak	Area	Compound	Peak	Area	Compound
470.65	18.551	KBr, NaCl	428.21	1.097	KBr, NaCl	439.78	0.368	KBr, NaCl	470.65	12.596	KBr, NaCl	468.72	0.364	KBr, NaCl	469.68	17.416	KBr, NaCl
555.52	10.398	KBr, NaCl	470.65	9.056	KBr, NaCl	466.79	0.442	KBr, NaCl	528.51	15.83	KBr, NaCl	678.97	0.661	KBr, NaCl	550.7	12.875	KBr, NaCl
582.52	20.731	KBr, NaCl	580.59	23.294	KBr, NaCl	576.74	1.089	KBr, NaCl	555.52	4.824	KBr, NaCl	723.33	0.95	NH wagging of amine	630.74	18.814	KBr, NaCl
686.68	18.553	KBr	684.75	10.703	KBr	680.89	0.659	KBr, NaCl	580.59	22.611	KBr, NaCl	858.35	0.567	β-D-sucrose	679.93	29.323	KBr, NaCl
725.26	29.924	NH_2 wagging of amine	721.4	17.453	NH wagging of amine	725.26	0.95	NH wagging of amine	682.82	8.186	KBr, NaCl	910.43	1.304	β-D-glucose, α-D-glucose	730.08	23.227	NH_2 wagging of amine
864.14	28.382	β-D-fructose, β-D-sucrose	848.71	19.202	α-D-glucose	860.28	0.875	β-D-sucrose, α-D-glucose	725.26	27.321	NH wagging of amine	987.59	1.559	alkenes	848.71	15.609	α-D-glucose
912.36	20.455	α-D-glucose	866.07	8.336	β-D-fructose, β-D- sucrose	912.36	2.14	β-D-sucrose, α-D-glucose	862.21	23.129	β-D-sucrose	1072.46	1.66	Si-O-C strechin g, aliphatic C-N stretchin g	867.03	12.366	β-D-fructose, β-D- sucrose
991.44	20.581	Alkenes	909.47	14.866	β-D-glucose	989.52	2.171	Alkenes	912.36	19.325	β-D-glucose , α-D-glucose	1166.97	3.362	Phenolics, Aromatic P-O stretchin g	918.15	8.412	β-D-glucose
1070.53	32.102	Si-O-C streching	941.29	7.879	NH stretching	1070.53	2.855	Si-O-C streching	991.44	22.94	alkenes	1240.27	0.481	Phenolics, Aromatic P-O stretchin g	941.29	9.779	NH stretching
1165.04	19.747	Phenolics, Aromatic P-O stretchin g	989.52	21.727	alkenes	1165.04	3.368	Phenolics, Aromatic P-O stretching	1070.53	39.995	Si-O-C strechin g, aliphatic C-N stretchi ng	1375.29	0.762	Leucine	989.52	30.625	alkenes

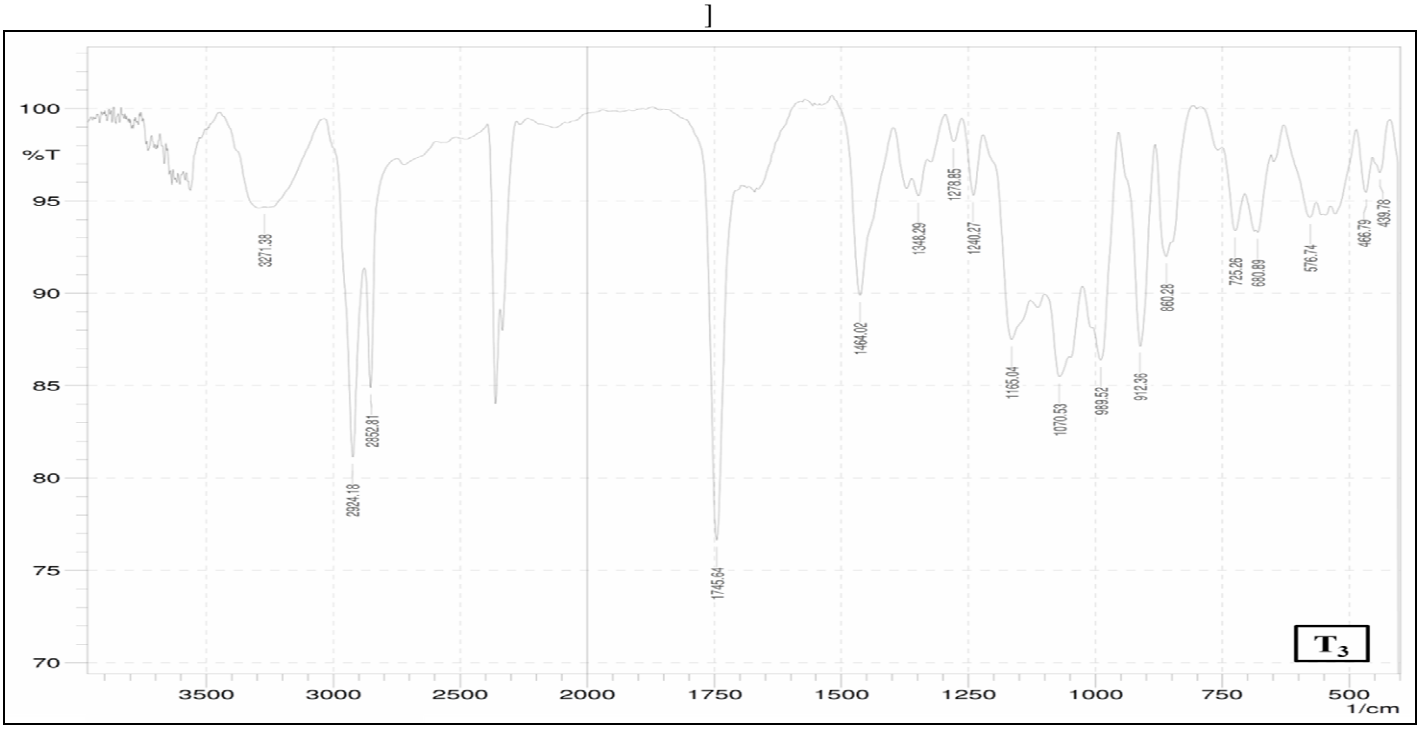
1240.27	17.249	Phenolics, Aromatic P-O stretching	1069.56	19.28	Phenolics, Aromatic P-O stretching, Si-O-C streching	1240.27	0.497	Phenolics, Aromatic P-O stretching	1136.11	13.074	Si-O-C strechin g, aliphatic C-N stretchi ng	1464.02	1.963	Alanine	1069.56	45.767	Si-O-C streching, aliphatic C-N stretching
1278.85	13.058	Phenolics, Aromatic P-O stretching	1117.79	10.894	Phenolics, Aromatic P-O stretching	1278.85	0.158	Phenolics, Aromatic P-O stretching	1240.27	18.037	Si-O-C strechin g, aliphatic C-N stretchi ng	1745.64	4.705	Fats, carbohydrates	1116.82	18.911	Phenolics
1348.29	12.689	Aromatic P=O streching (Phosphorus containing compound), Serine	1163.11	41.593	Phenolics, Aromatic P-O stretching	1348.29	0.539	Phenolics, Aromatic P-O stretching, Serine	1276.92	13.19	Aromatic C-N stretching of amine	2854.74	4.778	Fats, carbohydrates	1206.51	14.516	Phenolics, Aromatic P-O stretching
1462.09	30.962	Alanine	1240.27	20.961	Phenolics, Aromatic P-O stretching	1464.02	2.155	Alanine	1348.29	12.553	Aromatic C-N stretching of amine, Serine	2924.18	11.377	Fats, carbohydrates	1241.23	19.308	Phenolics, Aromatic P-O stretching
1745.64	45.929	Fats, carbohydrates	1279.81	11.752	Phenolics, Aromatic P-O stretching	1745.64	4.131	Fats, carbohydrates	1373.36	15.885	Leucine	3321.53	2.26	Water	1278.85	11.412	Phenolics, Aromatic P-O stretching
2854.74	59.632	Fats, carbohydrates	1345.39	8.249	Serine	2852.81	3.573	Fats, carbohydrates	1464.02	29.439	Alanine				1324.18	22.161	Aromatic P=O stretching of aromatic compounds
2924.18	56.836	Fats, carbohydrates	1375.29	17.99	Leucine	2924.18	6.027	Fats, carbohydrates	1658.84	9.349	Fats, protein				1344.43	14.858	Serine
3564.57	19.566	Water	1462.09	21.707	Alanine	3271.38	0.184	Water	1745.64	45.432	Fats				1368.54	11.868	Leucine
			1745.64	40.171	Fats, carbohydrates				2854.74	79.17	Fats				1435.09	32.432	C=C stretching of aromatic compounds
			2853.78	101.647	Fats, carbohydrates				2924.18	90.456	Fats				1459.2	28.365	Alanine
			2924.18	101.597	Fats, carbohydrates				3389.04	35.122	Water				1540.21	16.214	Protein (amide II)
															1662.69	34.441	Fats, protein
															1738.89	19.954	Fats, carbohydrates
															2918.4	49.394	Fats, carbohydrates
															3339.86	323.161	N-H stretching, Water
															3386.15	154.181	Water
															3562.64	73.238	Water

* Collected samples


%T
1/cm
3594.57
2924.18
2854.74
1745.64
1462.09
1346.29
1278.85
1240.27
1165.04
1070.53
991.44
912.36
864.14
725.26
666.68
562.52
555.62
470.65
T1


%T
1/cm
2924.18
2853.78
1745.64
1492.09
1375.29
1345.39
1279.81
1240.27
1153.11
1117.79
1069.96
989.52
941.29
909.47
866.07
843.71
721.40
694.75
590.59
470.65
428.21
T2

]


%T
1/cm
3271.38
2924.18
2852.81
1745.64
1494.02
1346.29
1278.85
1240.27
1165.04
1070.53
989.52
912.36
860.28
725.26
680.89
576.74
466.79
438.78
T3

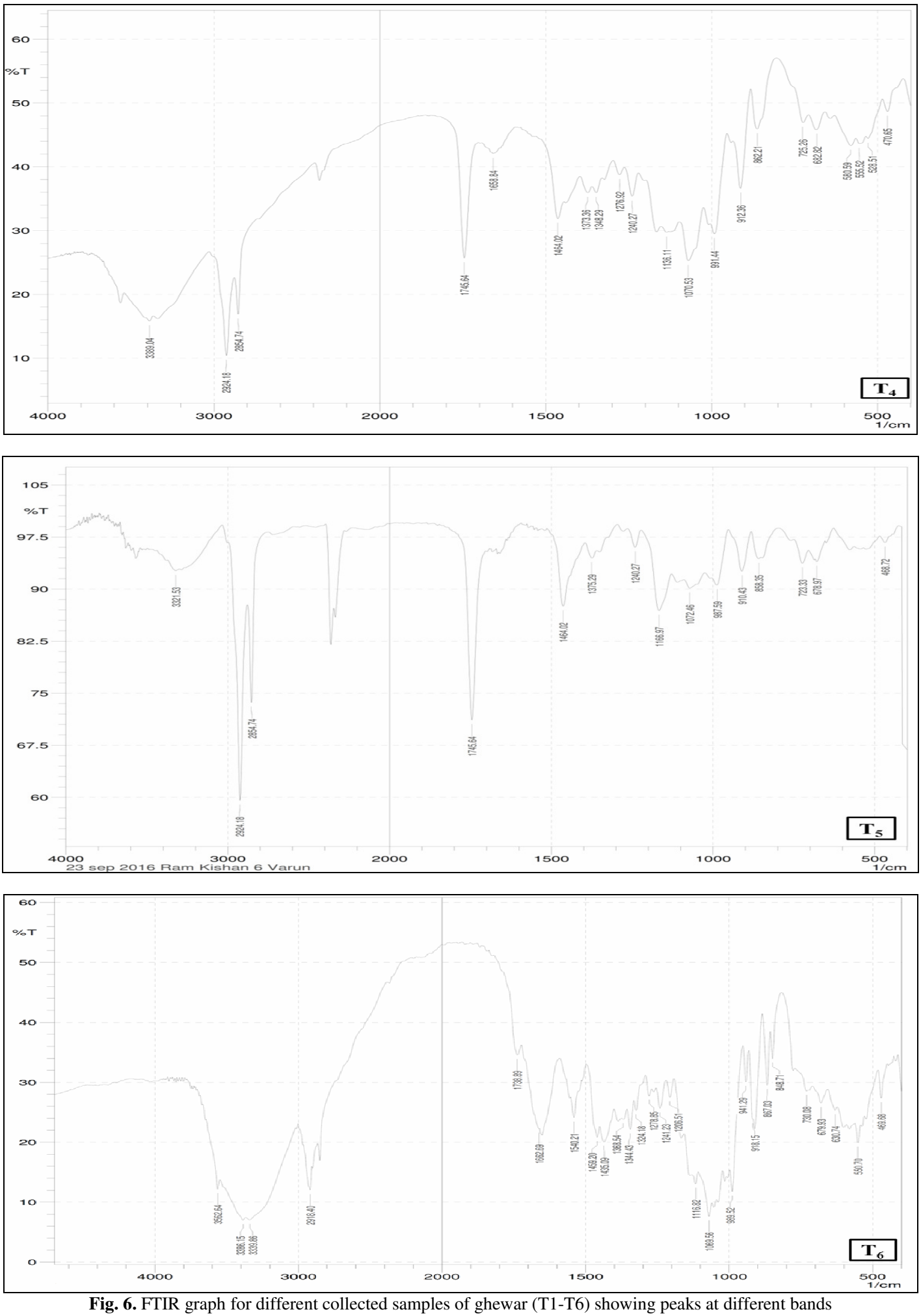


Fig. 6. FTIR graph for different collected samples of ghewar (T1-T6) showing peaks at different bands

Challenges

There are many challenges during the preparation process of ghewar such as when it is prepared in another seasons, much of the ghewar taste is lost due to the non-absorption of moisture. The temperature of oil is also very important during the frying of ghewar as told by the sweetmeat manufacturing experts and shopkeepers during survey. The most important consideration is batter should be of thin (free flowing) running consistency so that it is easier to pour continuously in a thin stream.

Conclusion

Ghewar is a traditional Indian sweet famous in areas of Northern India. The basic steps involved in the ghewar preparation were the same in all the shops surveyed; though variations in the type of adjuncts used. It has white to light brown colour and circular shape. It is available in different sizes of different weight and height. It is mostly used as sweet and for gift purposes during the teej, rakshabandhan and janmashtami festival. The prepared ghewar is sold in colourful cardboard boxes having a shelf life of about 7-9 days mostly. This survey will definitely help to attract the researchers and will help them to explore it for its nutritional and nutraceutical potential in brief as well as to develop the technology for its preservation and make it available throughout the year.

Acknowledgement

The authors are thankful to the Sweetshop owners of Gohana and Sonepat; and Department of Food Technology and Nutrition, Lovely Professional University, Phagwara (Punjab) India for providing infrastructural facilities and financial support.

Conflict of Interests

All authors have no conflicts of interest to declare.

References

AOAC. (2006). Official methods of analysis. 18th ed. Washington, DC: Association of Official Analytical Chemists.

Bali, P.S. (2011). Quantity Food Production Operations and Indian Cuisine. United Kingdom: Oxford University Press.

Bhadrecha, P.; Bala, M.; Khasa, Y.P.; Arshi, A.; Singh, J. and Kumar, M. (2020). Hippophae rhamnoides L. rhizobacteria exhibit diversified cellulase and pectinase activities. Physiology and Molecular Biology of Plants.

Bhati, S.; Kumar, V.; Singh, S. and Singh, J. (2020). Synthesis, Characterization, Antimicrobial, Anti-tubercular, Antioxidant Activities and Docking Simulations of Derivatives of 2-(pyridine-3-yl)-1H-benzo[d]imidazole and 1,3,4-Oxadiazole Analogy. Letters in Drug Design & Discovery.

Brand-Williams, W.; M.E. Cuvelier and C.L.W.T. Berset, (1995). Use of a Free Radical Method to Evaluate Antioxidant Activity. LWT-Food Science and Technology, 28 (1):25-30.

Deaton, A. and Dreze, J. (2009). Food and Nutrition in India: Facts and Interpretations. Economic and Political Weekly, 14(7): 42-65.

Gogia, N.; Kumar, P.; Singh, J.; Rani, A.S. and Kumar, P. (2014q). "Cloning and molecular characterization of an active gene from garlic (*Allium sativum* L.)" International Journal of Agriculture, Environment and Biotechnology, 7(1): 1-10.

Handa, V.; Kumar, V.; Panghal, A.; Suri, S. and Kaur, J. (2017). Effect of soaking and germination on physicochemical and functional attributes of horsegram flour. Journal of Food Science and Technology, 54(13): 4229-4239.

Joshi, V.K.; Kumar, A. and Thakur, N.S. (2015). Technology of preparation and consumption pattern of traditional alcoholic beverage 'Sur'of Himachal Pradesh. International Journal of Food and Fermentation Technology, 5(1): 75-82.

Kuhnlein, H.V. and Receveur, O. (1996). Dietary Change and Traditional Food Systems of Indigenous Peoples. Annual Review of Nutrition, 16(1): 417-442.

Kumar P.; Siddique A.; *et al*. (2018ff). Cadmium Induced Changes in Total Starch, total Amylose and Amylopectin Content in Putrescine and Mycorrhiza Treated Sorghum Crop. Nature Environment and Pollution Technology. 18(2): 525-530 2019.

Kumar, A.; Joshi, V.K. and Kumar, V. (2020). Systematic Investigation on Production and Quality Evaluation of Lugdi: A Traditional Alcoholic Beverage of Himachal Pradesh, India. Journal of Microbiology, Biotechnology and Food Sciences, 9(4): 1307-1311.

Kumar, A.; Kaur, A.; Tomer, V.; Rasane, P. and Gupta, K. (2020). Development of nutricereals and milk-based beverage: Process optimization and validation of improved nutritional properties. Journal of Food Process Engineering, 43(1): e13025.

Kumar, A.; Tomer, V.; Kaur, A.; Kumar, V. and Gupta, K. (2018). Millets: a solution to agrarian and nutritional challenges. Agriculture & food security, 7(1):31.

Kumar, P. (2013o). "Cultivation of traditional crops: an overlooked answer. Agriculture Update, 8(3): 504-508.

Kumar, P. (2014r). "Studies on cadmium, lead, chromium, and nickel scavenging capacity by in-vivo grown Musa paradisiacal. using atomic absorption spectroscopy" Journal of Functional and Environmental Botany, 4(1): 22-25.

Kumar, P. and Dwivedi, P. (2015p). "Role of polyamines for mitigation of cadmium toxicity in sorghum crop" Journal of Scientific Research, B.H.U.; 59: 121-148.

Kumar, P. and Dwivedi, P. (2018ab). Putrescine and Glomus mycorrhiza moderate cadmium actuated stress reactions in *Zea mays* L. by means of extraordinary reference to sugar and protein. Vegetos, 31(3): 74-77.

Kumar, P. and Dwivedi, P. (2018gg). Ameliorative Effects of Polyamines for Combating Heavy Metal Toxicity in Plants Growing in Contaminated Sites with Special Reference to Cadmium. CRC Press, Taylor & Francis Group, UK. pp. 404.

Kumar, P. and Mandal, B. (2014L). Dwivedi, "Combating heavy metals toxicity from hazardous waste sites by harnessing scavenging activity of some vegetable plants" vegetos, 26(2): 416-425.

Kumar, P. and Pathak, S. (2016w). "Heavy metal contagion in seed: its delivery, distribution, and uptake" Journal of the Kalash Sciences, An International Journal, 4(2): 65-66.

Kumar, P. and Pathak, S. (2018kk). Short-Term Response of Plants Grown under Heavy Metal Toxicity, Heavy Metals, Hosam El-Din M. Saleh and Refaat F. Aglan, IntechOpen, DOI: 10.5772/intechopen.75722. Available

from:https://www.intechopen.com/books/heavymetals/short-term-response-of-plants-grown-under-heavy-metal-toxicity.

Kumar, P. and Pathak, S. (2018pq). Listeria monocytogenes: Potent Clinical Hazard, Listeria Monocytogenes, Monde Alfred Nyila, IntechOpen, DOI: 10.5772/intechopen.76389. Available from:https://www.intechopen.com/books/listeria-monocytogenes/listeria monocytogenes-potent-clinical-hazard

Kumar, P. and Pathak, S. (2019f). "Responsiveness index of sorghum (*Sorghum bicolor* (l.) Moench) grown under cadmium contaminated soil treated with putrescine and mycorrhiza" Bangladesh J. Bot., 48 (1).

Kumar, P. and Purnima *et al*. (2018e). "Impact of Polyamines and Mycorrhiza on Chlorophyll Substance of Maize Grown under Cadmium Toxicity" International Journal of Current Microbiology and Applied Sciences, 7(10): 1635-1639.

Kumar, P.; Kumar, P.K. and Singh, S. (2014n). "Heavy metal analysis in the root, shoot and a leaf of psidium guajava l. by using atomic absorption spectrophotometer" Pollution Research, 33(4): 135-138.

Kumar, P.; Mandal, B. and Dwivedi P. (2014m). "Phytoremediation for defending heavy metal stress in weed flora" International Journal of Agriculture, Environment & Biotechnology, 6(4): 587-595.

Kumar, P.; Dwivedi, P. and Singh, P. (2012s). "Role of polyamine in combating heavy metal stress in stevia rebaudiana Bertoni plants under in vitro condition" International Journal of Agriculture, Environment and Biotechnology, 5(3): 185-187.

Kumar, P.; Harsavardhn, M. et al. (2018y). "Effect of Chlorophyll a/b ratio in Cadmium Contaminated Maize Leaves Treated with Putrescine and mycorrhiza" Annals of Biology 34(3): 281-283.

Kumar, P.; Krishna, V. *et al*. (2018cc). "Assessment of Scavenging Competence for Cadmium, Lead, Chromium and Nickel Metals by in vivo Grown *Zea mays* L. using Atomic Absorption Spectrophotometer, Annals of Ari-Bio Research, 23(2): 166-168.

Kumar, P.; Kumar, S. *et al*. (2018bb). "Evaluation of Plant Height and Leaf Length of Sorghum Grown Under Different Sources of Nutrition" Annals of Biology, 34(3): 284-286.

Kumar, P.; Mandal, B.; Dwivedi, P. (2011u). "Heavy metal scavenging capacity of *Mentha spicata* and *Allium cepa*" Medicinal Plant-International Journal of Phytomedicines and Related Industries, 3(4): 315-318.

Kumar, P.; Mandal, B.; Dwivedi, P. (2011v). "Screening plant species for their capacity of scavenging heavy metals from soils and sludges. Journal of Applied Horticulture, 13(2): 144-146.

Kumar, P.; Pandey, A.K. *et al*. (2018aa). "Phytoextraction of Lead, Chromium, Cadmium, and Nickel by Tagetes Plant Grown at Hazardous Waste site" Annals of Biology, 34(3): 287-289.

Kumar, P.; Pathak, S.; Kumar, M. and Dwivedi, P. (2018cd). Role of secondary metabolites for the mitigation of cadmium toxicity in sorghum grown under mycorrhizal inoculated hazardous waste site. In: Biotechnological Approaches for Medicinal and Aromatic Plants. Springer, Singapore, pp.199-212.

Kumar, P.; Siddique, A. *et al*.; (2019g). "Role of Polyamines and Endo-mycorrhiza on Leaf Morphology of Sorghum Grown under Cadmium Toxicity" Biological Forum – An International Journal. 11(1): 01-05.

Kumar, P.; Yumnam, J. *et al*. (2018z). "Cadmium Induced Changes in Germination of Maize Seed Treated with Mycorrhiza" Annals of Agri-Bio Research, 23(2): 169-170.

Kumar, V.; Kaur, J.; Gat, Y.; Chandel, A.; Suri, S. and Panghal, A. (2017). Optimization of the different variables for the development of a cucumber-based blended herbal beverage. Beverages, 3(4):50.

Mishra, P.K.; Maurya, B.R. and Kumar, P. (2012t). "Studies on the biochemical composition of *Parthenium hysterophorus* L. in different season" Journal of Functional and Environmental Botany, 2(2): 1-6.

Pathak, S.; Kumar, P.; Mishra, P.K and Kumar, M. (2017j). "Mycorrhiza assisted approach for bioremediation with special reference to biosorption", Pollution Research, Vol. 36(2).

Pathak, S.; Kumar, P.; Mishra, P.K. and Kumar, M. (2016x). "Plant-based remediation of arsenic-contaminated soil with special reference to sorghum- a sustainable approach for a cure". Journal of the Kalash Sciences, An International Journal, 4(2): 61-65.

Prakash, A. amd Kumar, P. (2017k). "Evaluation of heavy metal scavenging competence by in-vivo grown Ricinus communis L. using atomic absorption spectrophotometer" Pollution Research, 37(2): 148-151.

Ranganna, S. (2009). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. New Delhi: Tata McGraw-Hill Education.

Rasane, P.; Jha, A.; Sabikhi, L.; Kumar, A. and Unnikrishnan, V.S. (2015). Nutritional advantages of oats and opportunities for its processing as value added foods-a review. Journal of Food Science and Technology, 52(2): 662-675.

Rattanathanalerk, M.; Chiewchan, N. and Srichumpoung, W. (2005). Effect of Thermal Processing on the Quality Loss of Pineapple Juice. Journal of Food Engineering, 66(2): 259-265.

Sadasivam, S. and Manickam, A.C. (2004). Biochemical Method for Agricultural Sciences. 2nd ed. New Dehli: Wiley Eastern Limited.

Saxena, A.K.; Kulkarni, S.G.; Berry, S.K.; Sehgal, R.C. and Beerh, O.P. (1996). Studies on Preparation, Packaging and Storage of Ghewar: An Indian traditional sweet. Journal of Food Science and Technology, 33(5): 407-409.

Sharma, M.; Singh, J.; Chinnappan, P.; and Kumar, A. (2019). A comprehensive review of renewable energy production from biomass-derived bio-oil. Biotechnologia 100(2):179-194.

Sharma, R.; Jasrotia, K.; Singh, N.; Ghosh, P.; Sharma, N.R.; Singh, J.; Kanwar, R. and Kumar, A. (2020). A Comprehensive Review on Hydrothermal Carbonization of Biomass and its Applications. Chemistry Africa, 3(1):1-19

Siddique, A. and Kumar, P. (2018h). "Physiological and Biochemical basis of Pre-sowing soaking seed treatments-An overview" Plant Archive, 18(2): 1933-1937.

Siddique, A.; Kandpal, G. and Kumar P. (2018i). "Proline accumulation and its defensive role under Diverse

Stress condition in Plants: An Overview" Journal of Pure and Applied Microbiology, 12(3): 1655-1659.

Singh, S.; Kumar, V. and Singh, J. (2019). The effects of Fe(II), Cu(II) and Humic Acid on biodegradation of atrazine. Journal of Environmental Chemical Engineering, 8: 103539.

Singh, S.; Kumar, V.; Datta, S.; Dhanjal, D.S.; Sharma, K.; Samuel, J. and Singh, J. (2020). Current advancement and future prospect of biosorbents for bioremediation. Science of the Total Environment, 709: 135895.

Singh, S.; Kumar, V.; Datta, S.; Wani, A.B.; Dhanjal, D.S.; Romero, R. and Singh, J. (2020). Glyphosate uptake, translocation, resistance emergence in crops, analytical monitoring, toxicity, and degradation: a review. Environmental Chemistry.

Singh, S.; Kumar, V.; Kapoor, D.; Kumar, S.; Singh, S.; Dhanjal, D.S.; Datta, S.; Samuel, J.; Dey, P.; Wang, S.; Prasad, R. and Singh, J. (2020). Revealing on hydrogen sulfide and nitric oxide signals co-ordination for plant growth under stress conditions. Physiologia Plantarum, 168(2): 301-317.

Singh, S.; Kumar, V.; Singla, S.; Sharma, M.; Singh, D.P.; Prasad, R.; Thakur, V.K. and Singh, J. (2020). Kinetic Study of the Biodegradation of Acephate by Indigenous Soil Bacterial Isolates in the Presence of Humic Acid and Metal Ions. Biomolecules, 10: 433

Sood, M.; Sharma, S.S.; Singh, J, Prasad, R. and Kapoor, D. (2020). Stress Ameliorative Effects of Indole Acetic Acid on Hordeum vulgare L. Seedlings Subjected to Zinc Toxicity. Phyton – International Journal of Experimental Botany, 89(1): 71-86

Stuart, B.H. (2004). Infrared Spectroscopy: Fundamentals and Applications. John Wiley and Sons, Inc.; Hoboken, New Jersey, USA.