The Pharma Innovation Journal 2021; SP-10(8): 1056-1061

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(8): 1056-1061

www.thepharmajournal.com
Received: 25-06-2021
Accepted: 27-07-2021

Pravita Gupta
Department of Food Nutrition and Public Health, Ethelind College of Home Science SHUATS, Allahabad, Uttar Pradesh, India

Ritu Dubey
Department of Food Nutrition and Public Health, Ethelind College of Home Science SHUATS, Allahabad, Uttar Pradesh, India

Ranu Prasad
Department of Food Nutrition and Public Health, Ethelind College of Home Science SHUATS, Allahabad, Uttar Pradesh, India

PK Gupta
Barley Breeder, CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Corresponding Author
Pravita Gupta
Department of Food Nutrition and Public Health, Ethelind College of Home Science SHUATS, Allahabad, Uttar Pradesh, India

A study on determination of shelf life of developed value added malted barley RTC Upma premix

Pravita Gupta, Ritu Dubey, Ranu Prasad and PK Gupta

Abstract
The use of malted flour was done for the formulation of the RTC Upma premix. The treatment T_2 was packed in two packaging material i.e aluminum bag and plastic bag to access the shelf life at different interval of time. The microbial load, peroxide value, titrable acidity and moisture were estimated at 0, 15, 30, 45, 60, 75 and 90 days after storage and were compared for the best packaging material with the acceptable limit given by BIS. On the basis of the result it was observed that the premix was not found safe to consume after 60 days hence, the shelf life of Upma mix was 60 days at ambient condition and the Al(Aluminum) packaging was found best and safe for packaging in comparison to PL(Plastic). The yeast and mold increased significantly with increase in time interval in both AL and PL packaging material. The coliform bacteria count also increased significantly with increase in time interval in both AL and PL packaging material, whereas, for peroxide value, titrable acidity and moisture content the product was found safe in AL packaging.

Keywords: sensory quality, shelf life, titrable acidity, peroxide value and microbial load

Introduction
Ready to cook meals is a packaged meal that is already cooked or just need to reheat it before use. Many researchers have shown that the concept of ready to cook meal comes from during wars, military has limited resources to prepare food and it is available in pouches and tin cans. It is popularly used in US and Europe countries for ages and has a mature market in food industry. Although it has also captured a market share in Asian countries for past two decades. Ready to cook meals makes life easier in many ways, they are easy to prepare, ready to eat whenever you want to and you just have to reheat it and it is all done, it is also very easy to store. These meals can be stored for long time, they can be kept frozen for over three months and once it has cooked then can be stored up to three days in the refrigerator. So, it is a nice deal unlike the consumable commodities. The adoption of ready to cook meal is easier specifically for working women against home cooked meal because she usually don't get the time to make varieties of meal on everyday basis. That's why working women are more likely to buy convenience products than the housewives. The ready- to- cook food products are developed by the food companies in order to fulfill the consumers demand of high quality product, health conscious products, instant preparation of meal to enjoy at home or office. The maintenance of quality of such foods is of key importance for the success of the companies. The characterization of these products is generally done by short shelf life, being good substrates for microbial proliferation. Bacterial growth, color changes and lipid oxidation are to date well-recognized factors responsible for fresh meat and poultry acceptance (Zhao *et al*., 1994) [17].

Barley (Hordeum Vulgare) was first used as human food and evolved primarily into a feed, malting and brewing grain due in part to the rise in prominence of wheat and rice, and there is renewed interest throughout the world in barley food because of its nutritional value. The development of food products using whole grain barely, barely water and barely flour products have been formulated in food research laboratories. It has been used in human nutrition to improve nutritional health benefit. The food products such as biscuits, bread, crackers, cakes, desserts, malted soft drink, sauce, soup and Ice cream etc., by adding barley flour which has high content of β-Glucan. β-glucans (from barley, oat, and other cereals) has been regarded as important functional ingredients for the cereal foods industry (Brennan CS, Cleary LJ, 2005). Anti-nutritional factors however need to be addressed as grains have nutritional value which is of public importance. Barley is one of the best source of soluble and insoluble fiber which helps in decreasing the risk of chronic disease like coronary heart disease by decreasing

the concentration of high cholesterol level in body. Barley plays an important part in Indian diet, it also reduces the risk of some chronic diseases like coronary heart disease, Type II Diabetes and Cancer (Nirupam Ganguli). Consumption of barely based food several health benefits to alleviate the problems of life style disorders and Induction of body weight. β-Glucan promote the growth of beneficial microorganisms.
Similarly, Curry leaves are blessed with the goodness of nature, they are nutrients enriched and are loaded with Vitamin A, B, C, B12 and antioxidants like flavanoids. Apart from that, these leaves are also a great source of calcium and iron. Adding curry leaves to our daily diet can prevent us from several deficiencies and diseases resulting in strengthening our immunity naturally.
Shelf life can be determined from two sides: the product side and the consumer side. Determining shelf life from the product side implies investigating the deterioration of the product as a function of time and several models are available to assist in determination. Alternatively, determining shelf life from the consumer side implies asking consumers to accept or reject food which has been stored for various lengths of time without normally specifying the reason for acceptance or rejection. When shelf life is determined from the product side, sensory evaluation of the food is likely to be used either alone or in combination with instrumental or chemical analyses to determine the quality of the product. Many sensory test methodologies are available and can be classified into either analytical tests or hedonic tests. One of the problems with published shelf life studies is that insufficient details are given about the nature, experience and repeatability of the sensory panels employed. When determining shelf life from the consumer side, consumer dissatisfaction can be related to the survival function, and models applying survival analysis to the sensory shelf life of foods have been published. Because quality changes in foods are very complex, it is not always possible to make accurate predictions of shelf life based on a mechanistic insight. In such situations, it is necessary to resort to a statistical description so that the mean time to failure and its standard deviation can be accurately estimated, and the probability of future failures predicted.

Materials And Methods

Materials

The study was carried out in the Nutrition Research Laboratory, Food Nutrition and Public Health, Ethelind College of Home Science, Sam Higginbottom University of Agriculture Technology and Science, Allahabad.

Packaging of best accepted Value-Added Ready- To- Cook Premix.

The prepared value-added Ready to Cook Upma mix was packed in two different packaging materials, low-density polyethylene (LPD-P1) and laminated aluminum pouch (LAP-P2) with dimensions of 17×19cm. It was then kept at a room temperature for shelf life study.

Shelf life of the organoleptically best developed Value-Added Ready-To-Cook mix.

- Shelf life of the organoleptically best Value-Added Ready to Cook mix was observed for three months and the microbial analysis was determined by Bureau of Indian Standards **(**BIS, 1996) [3] for following criteria-

- **Microbial Analysis**
- Total plate count (TPC)
- Yeast and mould count (YMC)
- Presumptive Coliform test (PCT)
- Moisture estimation
- Peroxide value
- Titrable acidity
- Microbial Analysis
- Total plate count (TPC)
- Yeast and mould count (YMC)
- Presumptive coliform test (PCT)

The microbial analysis i.e. total plate count (TPC), Yeast and Mold Count(YMC), E.Coli and Presumptive Coliform test(PCT) of prepared Value added Ready-To-Cook premixes were done by using standardized procedure laid down in I.S.1947part III and manual in dairy bacteriology, ICAR publication (1972) [6].

Determination of Moisture

Principle: Sample was heated at specified temperature for specific period of time and the loss in weight was recorded as moisture content of the sample.

Requirements: Aluminum dishes, Tongs, Desiccators, and Analytical balance and Hot air oven.

Procedure

Accurately weighed 5 g of the sample in a tare porcelain dish (W_1 g). Dish was shaken until the contents were evenly distributed. Dish was placed in a Hot air oven maintained at 105ºC ± 2ºC and dried for at least 2 h. Dish was cooled in desiccators and weighing was repeated until the difference between two successive weighing was not more than 0.0002 g. The lowest weight was noted (W_2 g).

Observation

Tare weight of dish = W g
Wt. of dish with sample = W_1 g
Wt. of dish + sample after keeping in oven = W_2 g

Calculation

Moisture percentage = Loss of weight Initial weight of sample 100
= W1-W2W1-W100

Determination of Peroxide Value

Peroxide value of stored products at 0, 15, 30, 45, 60, 75 and 90 days was determined by the method of AOAC (2000)**.**

Reagents

- Acetic acid: chloroform solution (3:2, v/v)
- Saturated potassium iodide solution
- 0.01 N sodium thiosulphate solution
- Starch solution: one gram soluble starch was dissolved in cold distilled water to make thin paste. Then boiled distilled water was added and boiled for one minute while stirring. When completely dissolved, the volume was made to 100 ml.
- Potassium hydroxide solution (0.0178 N)

Procedure

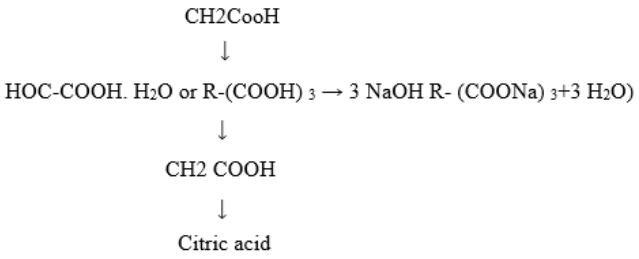
Five gram sample was taken in conical flask. Thirty ml acetic acid-chloroform mixture was added to the flask and swirled to dissolve. Then 0.5 ml saturated potassium iodide solution was added, kept for one minute with occasional shaking and 30 ml

distilled water was added. This was slowly titrated against 0.01 N sodium thiosulphate with vigorous shaking until yellow colour almost disappeared. Then 0.05 ml starch solution was added and titration continued with shaking vigorously to release all iodine from chloroform layer until blue colour just disappeared. The blank was run in the similar way. Peroxide value was calculated as:

$$\text{Peroxide value (meq peroxide/1000g)} = \frac{(S\text{-}B) \times N \times 1000}{\text{Weight of sample}}$$

Where,
B= Volume (ml) of Na2S2O3 used for titration of blank
S= Volume (ml) of Na2S2O3 used for titration of sample
N= Normality of Na2S2O3 solution

Ditermination of Titrable Acidity
Principle
The citrus fruit contain citric acid in large amount which gives its acidity. The acid are extracted or diluted with distilled water and determined by titrating with standard solution of sodium hydroxide.



Procedure
- Took known amount of sample (T0 and T1, T2 T3), 10 ml, accurately weighed and recorded as (w gm).
- Diluted 100ml distilled water in a 100 ml volumetric flask.
- Pipette out 20 ml aliquot and transferred in a clean beaker, added 2 drops of phenolphalein indicator and titrated with standard NaOH till faint pink colure was seen denoting end point.
- Repeated the titration with fresh aliquots till at least two concordant reading.

Calculation

$$\% \text{ Acidity (\% citric acid)} = \frac{V \times N.X\ 0.064 \times 100}{V1 \quad X \quad W}$$

Where
V= Volume of NaoH used in filter
N= Normality of NaoH
V1=Weight of sample taken
W= Weight of sample taken 0.064=Equivalent weight of citric acid/ 1000 (64/100)

Standardization of N/10 NaoH
0.1/N oxalic acid was taken in to a conical flask and one to two drops of phenolphthalein indicator was added. It was titrated against the unknown (thoroughly calculated) concentration of NaOH till the end point joint pink colour was obtained and the reading was noted.

Preparation of reagents for Titrable acidity
Preparation of reagents for making Standard NaOH (N/10)
4g of NaOH dissolved in the distilled water and makeup the volume in 1000ml volumetric flask.

0. 1N oxalic acid
Since the gram equivalent of oxalic acid was 63, the normal solution contains 63g/liter oxalic acid. Therefore, the required amount of oxalic acid for 0.1 / N oxalic acid.

Calculation

$N_1\ V_1 = N_2\ V_2$

Where
N_1= Normality of standard oxalic acid
V_1=Volume of Standard oxalic acid.
N_2=Normality of NaOH
V_2=Volume of NaOH solution used in Titration
This volume was taken into 100 ml volumetric flask and made up the volume with distilled water to the mark and mixed it thoroughly. This volume was called standard NaOH Solution and used for final sample titration.

Result And Discussion
Effect of Storage Period on Different Parameters of Value Added Ready- To -Cook Premix Packed in Different Packaging Material
The best obtained by organoleptic evaluation of the product Upma premix was packed in two packaging material i.e aluminum bag and plastic bag to access the self life at different interval of time. The yeast and mould count, microbial load, peroxide value, titrable acidity and moisture were estimated at 0, 15, 30, 45, 60, 75 and 90 days of storage and was compared for the best packaging material with the acceptable limit given by BIS.

Table 1: Effect of storage period and packaging material on total plate count (TPC) of value added RTC Upma premix 10^4 cfu/g.

Days	Packaging Material		BIS Standard Value (2006)
	AL	PL	
0	1.47 ± 0.42	1.67 ± 0.31	not more than 5×10^4 cfu/100g
15	3.03 ± 0.06	3.23 ± 0.25	
30	3.80 ± 0.20	4.10 ± 0.10	
45	4.27 ± 0.25	4.80 ± 0.20	
60	4.83 ± 0.21	5.00 ± 0.10	
75	5.13 ± 0.15	5.80 ± 0.20	
90	6.53 ± 0.42	7.80 ± 0.20	
F- test	S	S	

S. Ed. (±)	0.217	0.155	
C. D. (P = 0.05)	0.461	0.329	

Table3.shows that the total plate count of the best organoleptically accepted treatment of RTC Upma mix (T_2) in different packaging material at different storage period. The total plate count increased significantly with increase in time interval in both AL and PL packaging material.

In packaging material AL the premix lasted till 60 days, the total plate count in packaging material AL at day 60 was found (4.83 ± 0.21) which was within the acceptable limit as per standard value of BIS (2006), whereas in PL packaging material also the premix lasted till 60 days but in comparison to AL the PL showed increased TPC value i.e (5.00 ± 0.10) which was equal to the acceptable limit of the standard value of BIS (2006). On the basis of the result it was observed that the premix was not found safe to consume after 60 days hence, the selflife of Upma mix was 60 days at room temperature and the Al packaging was found best and safe for packaging in comparison to PL. According to Yaqoob *et al.*, (2018) [13] the total plate count of cakes containing barley flour (BF) increased non-significantly with increase in the level of raw barley flour. However, total plate count increased significantly with increase in the proportion of sprouted barley flour (SBF).

Table 2: Effect of storage period and packaging material on yeast and mold of value added RTC Upma premix cfu/g.

Days	Packaging Material		Bis Standard Value (2006)
	AL	PL	
0	0.000 ±0.000	0.000 ±0.000	not more than 10 cfu/100g
15	0.000 ±0.000	0.000 ±0.000	
30	0.000 ±0.000	0.907 ±0.064	
45	0.863 ±0.119	2.417 ±0.015	
60	1.910 ±0.078	3.243 ±0.015	
75	2.743 ±0.955	4.060 ±0.010	
90	4.793 ±0.179	6.917 ±0.015	
F- test	S	S	
S. Ed. (±)	0.291	0.017	
C. D. (P = 0.05)	0.617	0.037	

Table shows that the yeast and mold of the best organoleptically accepted treatment of RTC Upma mix (T_2) in different packaging material at different storage period. The yeast and mold increased significantly with increase in time interval in both AL and PL packaging material.

In packaging material AL the yeast and mold count was found absent at 0, 15 and 30 day, the yeast and mold count at day 90 was determined (4.793) which was within the acceptable limit of BIS standard value, whereas in PL packaging material the yeast and mold at day 90 was determined (6.917) which was also within the acceptable range of BIS standard value, but the yeast and mold growth was rapid in PL packaging than AL packaging. On the basis of the result it was observed that the premix was found safe to consume till 90 days and the Al packaging was found best and safe for packaging in comparison to PL. Similar study conducted by (Singh, 2011) [14] determined the yeast and mold of organoleptically best treatment of flour mixture (T_2) at different storage period and found that the yeast and mold count was absent at 0, 7th, 14th and 21st day and at day 28 the yeast and mold count was 5cfu/g and increased by 11 cfu/g at 35th day.

Table 3: Effect of storage period and packaging material on coliform count of value added RTC Upma premix cfu/g.

Days	Packaging Material		Bis Standard Value (2006)
	AL	PL	
0	0.000 ±0.000	0.000 ±0.000	not more than 10 cfu/100g
15	0.000 ±0.000	1.633 ±0.015	
30	1.360 ±0.010	3.633 ±0.015	
45	3.810 ±0.010	6.657 ±0.015	
60	6.120 ±0.020	8.550 ±0.010	
75	7.893 ±0.015	10.300 ±0.020	
90	8.663 ±0.015	14.257 ±0.015	
F- test	S	S	
S. Ed. (±)	0.009	0.011	
C. D. (P = 0.05)	0.020	0.024	

Table shows that the coliform count of the best organoleptically accepted treatment of RTC Upma mix (T_2) in different packaging material at different storage period. The coliform count increased significantly with increase in time interval in both AL and PL packaging material.

In packaging material AL the coliform count was found absent at 0 and 15 day, and at day 90 the coliform content was determined (8.663) which was within the acceptable limit of BIS standard value, whereas in PL packaging material the coliform content at day 90 was determined (14.257) which was greater the acceptable range of BIS standard value. On the basis of the result it was observed that the premix was found safe to consume till 90 days in AL packaging.

Table 4: Effect of storage period and packaging material on peroxide value of value added RTC Upma premix m.eq/kg.

Days	Packaging Material		Pfa Standard Value (2004)
	AL	PL	
0	1.980 ±0.000	1.980 ±0.010	not more than 10 m.eq/kg
15	3.280 ±0.010	3.663 ±0.015	
30	4.730 ±0.020	4.943 ±0.015	
45	5.933 ±0.015	6.340 ±0.010	
60	6.470 ±0.010	8.213 ±0.015	
75	7.887 ±0.021	10.130 ±0.020	
90	10.217 ±0.021	12.143 ±0.032	
F- test	S	S	
S. Ed. (±)	0.012	0.011	
C. D. (P = 0.05)	0.026	0.023	

Table shows that the peroxide value of the best organoleptically accepted treatment of RTC Upma mix (T_2) in different packaging material at different storage period. The peroxide value increased significantly with increase in time interval in both AL and PL packaging material.

In packaging material AL the peroxide value was (1.980) at day 0 which gradually increased upto (10.217) at day 90. The premix lasted and was safe to consume till day 75 with peroxide value (7.887) which was within the acceptable limit of PFA standard. Whereas, in PL packaging material the peroxide value at day 0 was determined (1.980) which gradually increased upto (12.130) at day 90. In PL packaging the premix lasted and was safe to consume till day 60 with peroxide value (8.213) and at day 75 is got diturated, hence, it was observed that the premix was found safe to consume in AL packaging material. In the study conducted by Kaur and Aggarwal (2015) [9] the peroxide value (PV) in fresh dried potato mix ranged 0.111% and 0.23 meq O2/kg fat, respectively. During storage, no significant ($p < 0.05$) difference in the levels of PV in dehydrated potato mix were observed. Another study done by Niroula (2012) [1] reviewed that the peroxide value (PV) of the product was observed to be 0.87 at initial which reached 1.18 and 1.4 in P2 (laminate PET + metallic BOPP) and P1 (laminate PET + BOPP) at 40 ºC respectively within 12 weeks. The value of PV obtained was far below the unacceptable level of maximum 3 meqv peroxide/kg fat.

In contrast to Kumar *et al.*, (2010) [8] in his study observed that the rate of autoxidation as measured by changes in PV and TBA values were significantly higher in samples packed in PP(plastic packs) as compared to those packed in MP(metallic packs). The peroxide value of wheat bran incorporated instant halwa mix packed in PP increased from 3.38 to 20.48 meqO2/Kg fat as compared to 3.38 to 17.88 meqO2/Kg fat in MP packed samples.

Table 5: Effect of storage period and packaging material on titrable acidity of value added RTC Upma premix %/100g.

Days	Packaging Material		Bsi Standard Value (2004)
	AL	PL	
0	0.000 ±0.000	0.000 ±0.000	not more than 1-2%/100g
15	0.000 ±0.000	0.000 ±0.000	
30	0.000 ±0.000	0.000 ±0.000	
45	0.317 ±0.015	0.633 ±0.015	
60	0.373 ±0.015	0.777 ±0.010	
75	0.413 ±0.015	0.860 ±0.015	
90	0.513 ± 0.015	1.010 ±0.015	
F- test	S	S	
S. Ed. (±)	0.009	0.008	
C. D. (P = 0.05)	0.019	0.018	

Table shows that the peroxide value of the best organoleptically accepted treatment of RTC Upma mix (T_2) in different packaging material at different storage period. The titrable acidity increased significantly with increase in time interval in both AL and PL packaging material.

In packaging material AL the titrable acidity was (0.00) at day 0 which gradually increased upto (0.513) at day 90 which was within the acceptable limit of BSI standard. Whereas, in PL packaging material the titrable acidity at day 0 was determined (0.00) which gradually increased upto (1.010) which was greater than the acceptable limit of BIS standard hence, it was observed that the premix was found safe to consume in AL packaging material.

Table 6: Effect of storage period and packaging material on moisture content of value added RTC Upma premix %/100g.

Days	Packaging Material		Bsi Standard Value (2006)
	AL	PL	
0	7.22 ±0.02	7.22 ±0.02	not more than 15%/100g
15	7.40 ±0.01	7.88 ±0.01	
30	7.93 ±0.02	8.46 ±0.01	
45	8.30 ±0.01	8.66 ±0.01	
60	8.60 ±0.02	9.57 ±0.026	
75	9.37 ±0.46	10.67 ±0.01	
90	10.01 ± 0.01	12.22 ±0.02	

F- test	S	S	
S. Ed. (±)	0.132	0.075	
C. D. (P = 0.05)	0.280	0.159	

Table shows the moisture content of the best organoleptically accepted treatment of RTC Upma mix (T_2) in different packaging material at different storage period. The moisture content increased significantly with increase in time interval in both AL and PL packaging material.

In packaging material AL the moisture content was **(**7.22) at day 0 which gradually increased upto (10.01) at day 90 which was within the acceptable limit of BSI standard. Whereas, in PL packaging material the moisture content at day 0 was determined (7.22) which gradually increased upto (12.22) which was also within the acceptable limit of BIS standard. It was observed that the rate of increase of moisture in premix was rapid in PL packaging in comparison to AL packaging hence, the AL packaging was found more safe for packaging. Similar study was conducted by Sethy and Mogra (2020) [15] and it was observed that moisture content of formulated dalia premix was found to be 8.17 to 8.36 percent from 0 days to 90 days. The increase in moisture content was slow and within the permissible limit and values differ significantly. Nagi *et.al.,* (2012) [11] observed that the gain in moisture content during storage might be due to hydroscopic nature of food products, storage environment (relative humidity and temperature) as well as nature of packaging material used. Another study conducted by Arora, (2017) [10] reported that the 15 days interval did not affected the moisture content upto 45 days of storage in LAP-P2 (laminated aluminum packaging) and as the days increased significant difference in moisture uptake percentage was reported whereas the rate of increase in moisture was low in LAP-P2 than LDP-P1. Chowdhury *et.al.,* (2011) [4] reported that the effect of moisture and packaging material on quality and self life of some locally packed *chanachur* for 3 months showed the increased moisture content for all samples.

Conclusion

The study showed that malted barley can be used to prepare the Ready- To- Cook foods and can be proved very nutritious and long lasting to consume. From the findings of the study undertaken, it is concluded that selected malted barley flours can be successfully incorporated with semolina to prepare the RTC Upma premix and was found safe to consume till day 60 when tested for microbiological load and it's shelf life was determined for 60 days.

References

1. Anuj Niroula. preparation and shelf life study of high energy biscuits, A dissertation submitted to the Food Technology Instruction Committee in Tribhuvan University 2012.
2. Aneja KR. Experiments in Microbiology, Plant Pathology and Biotechnology, New Age International Publishers, 2003;33-37, 388-389.
3. BIS (Bureau of Indian Standards,). "Ready-To-Eat Extruded Snacks – Specification" Indian Standard, Manak Bhavan, 9 Bahadur Shah Zafar Marg New Delhi 1996, 1-3
4. Chowdhury K, Khan S, Karim R, Obaid M, Hasan GMMA. "Effect of Moisture, Water Activity and Packaging Materials on Quality and Shelf Life of Some Locally Packed Chanachur". BCSIR, Dhaka-1205, Bangladesh. Institute of Food Science & Technology 2011;1:33-40.
5. Haseeb Haroon, Ummul Buneen, Yasmeen Bano, Mehak Fatima, Zeshan Akram, Subtain M *et al*. Studies on Utilization of Germinated Dried Powder of Barley for the Development of Lemon Ready to Serve Drink, Haya: The Saudi Journal of Life Sciences 2019:4(11):360-372
6. ICAR publication I.S.1947part III and manual in dairy bacteriology 1972.
7. Kumar, Srivastava RP. Food and Vegetable Preservation 3rd revised and enlarged Ed., International Book Distributing Co. (published division) Lucknow, 2002, 144
8. Kumar N, Sarkar CB, Sharma KH. "Development and Characterization of extruded product of carrot pomace, rice flour, and pulse powder." Department of Food Engineering and Technology, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur-148106, Punjab, India. African Journal of Food Science 2010;4(11):703-717.
9. Kaur S, Aggarwal P. Antioxidant and nutritional activities of potato flour as affected by different cooking methods. Research and Environmental Life Science 2015;8(4):645-650.
10. Monika Arora. Process Standardization of Ready-To-Cook (RTC) Value Added Vegetable Cheela Mix, Thesis submitted in the partial fulfillment of the requirement for the award of the degree of Doctor of Philosophy in Foods and Nutrition, SHUATS, Allahabad 2017, 1-160
11. Nagi HPS, Kaur J, Dar BN, Sharma S. Effect of Storage Period and Packaging on the Shelf Life of Cereal Bran Incorporated Biscuits. American J. Food Technol 2012;7:301-31
12. Akubor PI, Ukwuru MU. Functional Properties and Biscuit Making Potential of SoyBean and Cassava Flour Blends, Plant Foods for Human Nutrition 2005;58:1-12, 2003
13. Sabeeha Yaqoob, Baba WN. Effect of Sprouting on Cake Quality from Wheat – Barley Flour Blends, Springer 2018, 22-38.
14. Singh AK, Dattatreya M Kadam, Mili Saxena RP Singh. Effect of Soy Flour Supplimentation on the Quality and Shelf Life of Gulabjamuns. International Journal of Food Science and Nutrition Engineering 2011;1(1): 11-17
15. Sujata Sethy, Renu Mogra. An Evaluation of Ready-to-Cook Dalia Mixes Formulated for Preschool Children, Chem Science Review Letter 2020;9(34):496-501
16. Essays UK. Quality Perception of Ready to Cook Meals 2018. Retrieved from https://www.ukessays.com/essays/business/effects-of-housewife-quality-perception-of-ready-to-cook-meals-business-essay.php?vref=1
17. Zhao Y, Wells JH, McMillen KW. Application of dynamic modified atmosphere packaging systems for fresh red meats: Review. J Muscle Foods. 1994;5:299-328. doi: 10.1111/j.1745-4573.1994.tb00538.x.