



## Development and Evaluation of Malted Oat Incorporated *Burfi*

Ankita\*,RekhPhogat,RakeshGehlot, LalitaKeshwania, Vishal Lohan

Centre of Food Science and Technology, ChaudharyChran Singh Haryana Agricultural University,Hisar,Haryana, India

### ABSTRACT

The present study entitled "Development and evaluation of malted oat incorporated *burfi*" was aimed to standardize the process for development of malted oat incorporated *burfi* and evaluate for sensory and proximate analysis. Malted wheat and oat grits were blended in various proportions *i.e.*, 100:0, 75:25, 50:50, 25:75 & 0:100 and were used for the preparation of *burfi*. Wheat:oat (75:25) *burfi* was arbitrated best with highest overall acceptability scores of 8.80 among all the variants. Addition of malted oat increased fat, protein and fibre content in the *burfi*. Therefore, use of malted oat has positive effect on acceptability and nutritive value of *burfi* due to which it can be a healthy alternative for captivating more consumers.

Keywords:Burfi; Oat; Sensory analysis; Proximate analysis; Nutritive value

### 1. Introduction

Oat is a low input and nutrition packed cereal crop well suited to temperate and humid climatic conditions mainly grown all over northern, western and central India. Composition of oats makes it a unique and valuable health food. It consists of appreciable amount of unsaturated fatty acids, soluble and insoluble dietary fibres, protein and starch and is the only cereal containing avenalins, legume-like protein as the major storage protein.  $\beta$ -glucan is the main component of the soluble fibre in oats that acts as a biologically defence modifier as it helps in reduction of total and low density lipoprotein cholesterol, controlling glycemia and combating constipation. Oat is therapeutically active against various diseases and exerts antioxidant, anti-inflammatory and antidiabetic effects [9].

Malting, the controlled germination of grains involves steeping, germination and kilning used for centuries to soften the kernel structure, increase nutrient bioavailability along with the addition of new flavours to the product [5]. Steeping leads to the softening of grain and provides desirable conditions for germination. Germination leads to an increase in phytase activity that causes degradation of phytates and increases availability of micronutrients especially minerals along with lysine and tryptophan content but a slight decrease in prolamine content, offers a method for improving the nutritional value of oats. Kilning of grains is required for termination of germination process at 80°C or more depending on the type of malt. It halts biochemical reactions and ensures microbiological stability of dried products. Malting enhances sensory attributes of oat products, but the use of oat malt is currently very limited [6].

Malted oat can be used in functional food products such as porridge, oatmeal, breakfast cereals, flakes, muesli, granola, bread, biscuits, cookies, *burfi*, infant foods, oat milk and oat based probiotic drink and can be incorporated with milk. *Burfi* is a popular traditional confectionery product of India, generally prepared from partially dehydrated, heat-desiccated whole milk with addition of sugar. Amongst various categories of Indian milk based sweets available, heat desiccated category presents a pleasing and healthful variety of products compared to others. The main challenges in development of new ingredients and products from malted oats are to find innovative ways to combine different processing methods and to formulate the final product concepts that captivate diverse consumers. The present study was designed to standardise the process parameters of *burfi* developed from malted oat and evaluate its sensory and chemical properties.

### 2. Materials and Methodology

The present research work was carried out in Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, Haryana, India.

### 2.1. Raw Material

Oat variety (OS-6) and wheat (C-306) were collected from the Department of Genetics and Plant Breeding, CCS Haryana Agricultural University, Hisar. Milk (Amul full cream), desi ghee (Vita), sugar and other ingredients were procured from the local market.

### 2.2. Methodology

The following methods are used for the development and evaluation of *burfi*.

#### Malting and milling

All the lighter foreign matter from the grains was removed by winnowing, sieving and remaining extraneous matter such as weeds and stones were handpicked. Cleaned wheat and oat grains were treated with 2% sodium hypochlorite solution for 10-15 minutes, thoroughly washed with distilled water and steeped, oats for 24 hours while wheat for 7-8 hours. Steeped grains were drained and spread evenly on trays. Hydrated grains were kept in the dark for 24 hours at room temperature for wheat while oat at 15°C for 72 hours to reach more than 90% germination. Germinated wheat and oat were dried in a tray dryer at 60°C for 10-14 hr and kilned at 80°C for 3-4 hr to stop the enzyme activity. The kilned grains were cooled, lightly scrubbed by hands and screened to remove the rootlets. Malted wheat and oat grains were milled with a lab scale grain mill (Parnami Super) and were passed through a 1.0 mm sieve.

#### Standardization of *burfi*

To develop food products, standardisation is an important factor for getting better consumer acceptability along with its physical, chemical and microbial quality. Malted wheat and oat grits were blended in various proportions *i.e.*, 100:0, 75:25, 50:50, 25:75 & 0:100 and were used for the preparation of *burfi*. *i.e.*, 60g of mixture with 110g of sugar in 1kg of milk. Milk was boiled and a mixture of oat and wheat was added. 0.5% citric acid solution was added for coagulation, cooked till end point reached, sugar was added, mixed and cooked, sheeted in a greased tray, cooled overnight and cut into desired pieces. The samples were then subjected to sensory evaluation. The final selected combination of *burfi* along with control was then evaluated for physico-chemical tests.

#### Sensory evaluation

*Burfi* samples were subjected to sensory evaluation for color & appearance, aroma, taste, texture and overall acceptability by a panel of 10 semi-trained judges using 9 point Hedonic Scale (as shown in Table 1). The overall rating was obtained by averaging the scores given by the panellists.

**Table 1. Acceptability scores**

Acceptability	Score
Like Extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like or dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

#### Proximate analysis

The best selected combination of *burfi* along with control *burfi* samples were subjected to proximate analysis *i.e.*, moisture, fat, protein, fibre and ash content as outlined in AOAC (2005).

#### Statistical analysis

The data obtained in the present investigation was subjected to analysis of variance (ANOVA) technique and analysed according to three factorial completely randomized *design* (CRD). The critical difference value at P = 5% level was used for making comparisons. For chemical characteristics of *burfi*, t-test and standard deviation (SD) was calculated to compare the means.

## 3. Result and discussion

#### Sensory evaluation

Malted wheat and oat grits were blended as, 100:0, 75:25, 50:50, 25:75 & 0:100 and processed for the preparation of wheat:oat*burfi* variants. The sensory scores on the 9 point Hedonic scale are illustrated in Table 2 and Fig 1. Among all the variants colour and appearance (8.75 and 8.78) score was highest for 75:25 and 50:50 wheat:oat*burfi*. Fat is responsible for the gloss, surface finish and appearance [10]. Texture, taste and flavour score was highest for wheat:oat (75:25) *burfi*. *i.e.*, 8.80, 8.90 and 8.75, respectively. Wheat:oat (75:25) *burfi* was adjudicated best with overall acceptability score of 8.80 among all the variants due to the fine textural property, good taste and slightly nice caramelised flavour of oat. Slight caramelization might be due to the non-enzymatic reaction between sugar and components of cereal in the presence of heat [3]. Roasting and kilning of oat enhanced the sensory attributes of *burfi*.

**Table 2. Effect of incorporation of malted oat on sensory scores of burfi**

<i>Burfi</i> (Wheat:Oat)	Colour and appearance	Texture	Taste	Flavour	Overall acceptability
100:0	8.10±0.32	8.40±0.48	8.10±0.42	7.98±0.35	8.14±0.22
75:25	8.75±0.42	8.80±0.42	8.90±0.21	8.75±0.24	8.80±0.16
50:50	8.78±0.32	8.52±0.42	8.50±0.39	8.45±0.44	8.56±0.14
25:75	8.30±0.67	7.60±0.51	7.50±0.52	7.60±0.52	7.75±0.38
100:0	8.00±0.32	7.80±0.79	7.80±0.79	8.00±0.11	7.90±0.33
CD at 5%	<b>0.40</b>	<b>0.27</b>	<b>0.37</b>	<b>0.29</b>	<b>0.13</b>

Values are mean ± SD of ten replicates using 9 point Hedonic scale

#### Proximate analysis

Proximate analysis of best selected combination (75:25, wheat:oat) and control (100:0 and 0:100, wheat:oat) *burfi* are presented in Table 3. The highest moisture content (14.84%) was observed for 0:100 *burfi* followed by 75:25 *burfi* (13.87%) and 100:0 *burfi* (12.48%). The increase in moisture content might be due to the increase in the oat content. The present investigation correlates with reference [7] indicating that increase in the concentration of pineapple resulted in increase in moisture content of *burfi*. Low moisture content in *burfi* makes it hard, dry, difficult to chew and unacceptable as reported by reference [2].

Crude protein was 14.11% in wheat:oat (0:100), 13.41% in wheat:oat (75:25) and 12.55% in wheat:oat (100:0) *burfi*. Wheat:oat (0:100) *burfi* had the highest crude protein followed by wheat:oat (75:25) and wheat:oat (100:0) *burfi*. 14.72% fat was observed in wheat:oat (0:100) *burfi* which was higher than wheat:oat (75:25) *burfi* (13.58%) followed by 12.16% in wheat:oat (100:0) *burfi*. Fat and protein content was high for *burfi*s prepared from 100% oat; this might be due to the high fat and protein content in oat which has nutritional and functional importance. Similar results were observed by reference [8] after addition of oats in date fruit based snack bar.

Highest crude fibre was observed in wheat:oat (100:0) *burfi* followed by wheat:oat (75:25) and wheat:oat (0:100) *burfi* i.e., 3.78, 3.22 and 2.58%, respectively. Addition of oats increases the fibre content in *burfi* which has valuable health benefits. Ash content was highest (1.87%) in wheat:oat (0:100) whereas no significant difference was observed in wheat:oat (75:25) and wheat:oat (100:0) *burfi*. The ash percentage gives an idea about the inorganic content of the samples from where the mineral content could be obtained. Samples with high content of ash indicate high concentration of various mineral elements, which are expected to speed up metabolic processes, improve growth and development [4]. The result for fibre and ash content is in accordance with study conducted by reference [8].

**Table 3. Proximate analysis of burfi**

Treatments	100:0	75:25	0:100	CD at 5%
Moisture(%)	12.48±0.39	13.87±0.66	14.84±0.32	<b>1.28</b>
Crude protein (%)	12.55±0.09	13.41±0.33	14.11±0.13	<b>0.49</b>
Crude Fat (%)	12.16±0.06	13.58±0.09	14.72±0.43	<b>0.59</b>
Crude fibre(%)	2.58±0.08	3.22±0.23	3.78±0.18	<b>0.33</b>
Ash (%)	1.66±0.10	1.76±0.02	1.87±0.05	<b>0.10</b>

Values are mean ± SD of three replicates

#### 4. Conclusion

It can be concluded that malted oat can be successfully incorporated with wheat to produce a nutritious and highly acceptable *burfi* using oat. The combination 75:25 (wheat:oat) was most liked by the sensory panelist. Due to the presence of high protein, fat and fibre contents with desirable taste and flavour, oat *burfi* would be a healthy and attractive alternative to conventional *burfi* available in the market.

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