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## Recipe standardization and manufacturing of bitter gourd chips

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**Abstract**

The current trend in the food industry has shown tremendous growth due to change in lifestyle as well as the variety of taste available outside. Bitter gourd chips are on the variety of food that people uses with breakfast as snacks. Chips are prepared by slicing bitter gourd and frying the chips in vessel contained oil at controlled temperature using the furnace. The crisp of chips depends on a number of factors including the quality of oil, the temperature of the oil, frying time, quality of bitter gourd and moisture contained in the chips. This study concludes with a case study of a manufacturing unit producing bitter gourd chips. The study was beneficial in the nutritional eating point of view.

**Keywords:** Bitter gourd, recipe standardization, bitter gourd chips, sensory evaluation

**Introduction**

Deep-fat fried vegetables and fruit chips (containing 35-45% oil content) are covering a wide range in the food market across the World due to their convenience and availability (Maity *et al.*, 2012; Pedreschi and Moyano 2005) [18, 19]. However, consumers today are always seeking healthy snacks with low fat and attractive color, texture and taste because the excessive consumption of such high-oil fried products can cause obesity and other diseases such as cardiovascular disease (Akinpelu *et al.*, 2014; Pedreschi and Moyano 2005) [3, 19]. Much research has been conducted to reduce the fat content in deep-fat fried products by different approaches such as altering the frying temperature, modifying process conditions, the pretreatments like blanching, dipping in sugar solutions, using edible coatings, adding hydrocolloids and predrying (Bravo *et al.*, 2011; Pedreschi and Moyano 2005) [7, 19]. It was observed that pre-drying, baking and microwave treatment of the slices before deep-fat frying was helpful to significantly reduce the amount of oil content in the chips (Krokida *et al.*, 2001) [16]. Pre-drying of the bitter gourd slices before frying improved the final product quality with low fat and it was observed that the pre-drying of French fries helped to absorb low fat content during frying and enhanced color and texture of the chips (Tajner-Czopek *et al.*, 2008) [23].

Bitter gourd (*Momordica charantia* Linn) also known as bitter melon is a vegetable that looks like a cucumber but with ugly gourd-like bumps all over it. Bitter gourds are commonly found in Asian countries and South America because it thrives in hot and humid climates.

This vegetable tastes bitter as its name implies, it is used as ingredient in salads or vegetable dishes where it is believed to lower sugar content in the blood. Bitter gourds are very low in calories but dense with precious nutrients. It is an excellent source of vitamins B1, B2, and B3, C, magnesium, folic acid, zinc, phosphorus, manganese, and has high dietary fiber. Although the seeds, leaves, and vines of this vegetable have different uses, the fruit is the most predominantly used part of the plant in traditional herbal medicine. Depending on location, bitter gourd is also known as bitter melon, karela or balsam pear. The immature fruits and tender vine tips are used in a variety of culinary preparation. The seeds are white in raw fruits and become red when they are ripe. Cultivars like Phule Green Gold, Hirkani and Konkan Tara are used extensively for cultivation in Maharashtra. Bitter gourd crop requires two consecutive seasons to complete its growth. Bitter gourd is antidotal, antilypolytic, lypogenic, antipyretic tonic, appetizing, stomachic and antibilious and it shows purgative, anti-inflammatory, antifatulent and has healing capacity (Kumar and Sagar, 2003) [19].

Various types of bitter gourds are available in around the world. India long green, India long white and Hybrid India baby are available in India whereas Japan Green Spindle, Green Lover, Hong Kong Green are famous in Japan, China and Hong Kong, respectively (Alam, *et al.*, 2015) [4].

Fresh cut bitter gourds have only 4 days shelf life Bitter gourd fruits and leaves are generally consumed as stir frying or cooking as curries, boiling, steaming, juice, extracts, and tea (Abdullah and Kamarudin, 2013) [1]. However, various parts of bitter gourd are using in many

purposes reported by Kandangath, *et al.*, (2015) [15]. Bitter gourd leaf paste or hot water extract could be used to reduce or control of many diseases such as treatment of leprosy, piles and jaundice; treatment of ringworm, bowel movement, cough, congestion and chest pain (Kandangath, *et al.*, 2015) [15]. Bitter gourd fruit juice has many positive health properties such as anti diabetes, treatment of malarial fevers and anti-helminthic (Abdullah and Kamarudin, 2013) [1]. Moreover, bitter gourd seed could produce spontaneously vomiting and also used to reduce fat (Abdullah and Kamarudin, 2013; Kandangath, *et al.*, 2015) [1, 15].

Nutritional Profiles Nutritional compositions of bitter gourd vegetable are shown in Table 2. Ali, *et al.*, (2008) [5] reported that bitter gourd is an important source of carbohydrate, proteins, vitamins, minerals and other nutrients for maintaining proper health. It is a highly nutritious vegetable due to the presence of higher amount of protein, ascorbic acid, calcium, iron, and phosphorus (Assubaie and El-Garawany, 2004) [6]. Total fat content of whole fruit ranged from 2.9%-6.4% of dry matter (Chuang, *et al.*, 2006; Habicht, *et al.*, 2011) [9, 11]. Bitter gourd also contains high amount of Vitamin A, vitamins B1, B2, B3 and B9 (Joseph and Jini, 2013). It is also good source of inorganic minerals such as Phosphorus, potassium, calcium, magnesium, sodium, Iron and zinc (Islam, *et al.*, 2011) [13]. Bitter gourd vegetables also contain different types of amino acids such as glutamine, asparagines, glycine, lysine, alanine, leucine, valine, arginine, proline, serine, isoleucine, phenylalanine, tryptophan, histidine, threonine, methionine (Islam, *et al.*, 2011) [13].

The quality and quantity of bioactive compound present in bitter gourd could be depends on many factors such as harvest time, temperature, state of maturity, and post harvest storage as well as size, shape, colour of bitter gourd (Horax, *et al.*,

2005; Tan, *et al.*, 2014; Sing, *et al.*, 2016) [12, 24]. In addition, bioactive compounds extraction from bitter gourd depends on temperature, length of extraction, particle size and number of extractions of a sample, water to powder ratio, powder particle size, the ratio of water and plant material and the type of solvents used (Sorifa, *et al.*, 2010; Cerda, *et al.*, 2013; Tan, *et al.*, 2016) [22, 10]. In this section we have described different types of bioactive compounds of bitter gourd vegetables.

The presence of noval phytochemical in bitter gourd has clearly demonstrated the ability to inhibit the enzyme guanylate cyclase and the enzyme is linked with pathogenesis and replication of psoriasis, leukemia and cancer (Ahmed, *et al.*, 1998) [2]. Bitter gourd has excellent medicinal virtues. The medicinal value of bitter gourd in the treatment of infections, diseases and diabetics is attracting the attention of scientists worldwide. Bitter gourd is anti-diabetic, stimulant, laxative, blood purifier and controls diabetics (Raman and Lau, 1996) [20].

## 2. Materials and Methodology

**Table 1:** Recipe for Preparation of Bitter gourd Chips (for 100gm)

Sr. No.	Name of Ingredients	Amount of Ingredients
1.	Bitter gourd	100gm
2.	Rice flour	2gm
3.	Corn flour	2gm
4.	Salt	2gm
5.	Turmeric powder	1gm
6.	Edible oil	25ml
7.	Chilli powder	1gm
8.	Coriander powder	0.2gm
9.	Chaat masala	0.5gm



**Fig 1:** Show the bitter melon vegetable

### 2.1 Procedure

#### 2.2.1 Selection of raw material

Select the good quality of bitter gourd for making the chips. It should be mature, free from damage. Especially select the variety named as "PHULE PRIYANKA" from the market. It is in green in colour and low in bitterness. That's why we select this variety.

#### 2.2.2 Washing

Washing is carried out under running tap water to remove the extraneous matter i.e. dirt, dust, soil particles, pesticidal residues etc. from the surface of the bitter gourd.

#### 2.2.3 Slicing

Prepare the slices of bittergourd with the help of clean & sharp slicer

#### 2.2.4 Soaking

Treat these slices with 2% of salt and the 1% of the turmeric powder and keep it for overnight to reduce the bitterness.

#### 2.2.5 Mixing of ingredient

Weight all the ingredients according to standard receipe, sieve it. Mix all the ingredients properly.

#### 2.2.6. Sprinkling

Take the prepared bitter gourd slices in plate & sprinkle all of the mixed ingredients on it.

#### 2.2.7. Frying

Deep frying is carried out in the edible oil (Soyabean oil), till chips becomes golden brown in colour which makes it crispy.

#### 2.2.8 Draining

After frying chips were removed & drained on the paper to reduce oil contain.

#### 2.2.9 Seasoning

Chaat masala is sprinkled on fried chips to increase palatability.

### 2.2.10 Packaging

The final product i.e. bitter gourd chips were packed into the LDPE bags & sealed with the help of sealing machine & well labeled.

## 3. Result and Discussion

### Result and Discussion

**Table 2:** The sample T1 of bitter gourd chips is selected by using above sensory evaluation chart by the different sensory evaluators.

Sr. No.	Parameter	T1	T2	T3	T4	T5
1	General Appearance	8	8	8	8	7
2	Colour	9	8	8	7	6
3	Flavour	8	7	7	7	7
4	Taste	9	8	8	8	8
5	Odour	8	7	8	9	7
6	Overall Acceptability	8.4	7.6	7.8	7.8	5.6

## 4. Conclusion

The bitter gourds were not stored and the chips get a reddish brown color which made the taste of chips bitter. During frying, this skin did not take higher temperature and get black or reddish color. Also, it ruined the physical appearance. The carbide particles did not stick to the plate of peeling machine properly so it leaves plate surface and gets stuck into bitter gourd which finally ruptures the blades of the slicing machine. The rupture or wear of blades creates uneven pieces of chips during cutting. Finally, the proper time must be given for the frying of the chips. Continuous stirring of the oil filled pan is required for the proper heating of individual chip homogeneously. The temperature required is maintained 195° C for proper fomentation which also improves the quality of the chips. With this study the bitter gourd chips increase edibility of chips. So the bitter gourd chips were helpful nutritional eating point of view.

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