

## Preparation, processing and nutritional attributes of raw and germinated fenugreek seed pickles

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### Abstract

The present study was conducted to study Preparation, Processing and Nutritional Attributes of Raw and Germinated Fenugreek Seed Pickles. Raw and germinated fenugreek seed pickle using vinegar was most acceptable and overall acceptability score was 7.94 (liked very much) and 8.82 (liked extremely), respectively. Raw and germinated fenugreek seed pickle containing lemon juice and vinegar are most suitable for diabetic and others who want to restrict calories.

**Keywords:** germination, processing, de-bitter, nutritional attributes

### 1. Introduction

Fenugreek also has been used for over two thousand years as a medicinal plant in various parts of the world (Srinivasan, 2006) <sup>[10]</sup> and regarded as the oldest medicinal plant in human history (Lust, 1986 cited in Petropoulos, 2002) <sup>[9]</sup>.

It is well known for its fibre, gum and other chemical constituents and volatile contents. Dietary fibre of fenugreek seed is about 25 per cent which changes the texture of food. These days it is used as stabilizer, adhesive and emulsifying agent due to its high fibre, protein and gum contents. The protein of fenugreek is found to be more soluble at alkaline pH (Meghwal and Goswami, 2012) <sup>[7]</sup>. Its seeds contain a substantial amount of phospholipids, glycolipids, oleic acid, linolenic acid, linoleic acid, choline, vitamins A, B1, B2, C, nicotinic acid, niacin, and many other functional elements (Ahmed *et al.*, 2016) <sup>[11]</sup>.

It is used as a herb (dried or fresh leaves), spice (seeds), and vegetable (fresh leaves, sprouts, and microgreens). Sotolon is the chemical responsible for fenugreek's distinctive sweet smell. Both whole and powdered forms are used in the preparation of pickles, vegetable dishes, dal, and spice mixes such as *panch phoron* and *sambar* powder. They are often roasted to reduce bitterness and enhance flavor (BBC 2017) <sup>[3]</sup>.

Raw fenugreek seeds have maple flavor and bitter taste but by the process of germination and roasting, their bitterness can be reduced and flavor can be enhanced. Dried seeds are used as condiments (Murlidhar and Goswami, 2012) <sup>[8]</sup>.

The seeds of fenugreek have been used as an orally as insulin substitute for reduction in blood glucose, and the extract from seed lowered blood glucose level (Madar and Stark, 2002) <sup>[5]</sup>. The antifungal and antibacterial properties

of fenugreek are now being applied to food preservation. It is employed as a mouth wash and gargle and in West Africa the gum of fenugreek resin is boiled for the treatment of inflammation of the eyes by holding the face over the steaming pot (Al-Jawfi *et al.*, 2013) <sup>[2]</sup>

In India seeds are used either boiled, pressure cooked, roasted or germinated, this basic processing is done to make seeds soft, palatable and to remove their bitterness (Mathur and Chaudhary 2009) <sup>[6]</sup>.

### 2. Methodology

#### 2.1 Collection of ingredients

Fenugreek seeds, mustard oil, condiments and spices purchased from the local market of Kumarganj, Ayodhya. The fenugreek seeds were washed with clean water to remove dirt, sand and other undesirable materials before use.

#### 2.2 Preparation of classified sample

This phase involved the processing of sample of fenugreek which was collected from local market of Kumarganj, Ayodhya. All of these products are clean and pure. Other materials like cumin seeds, onion seeds, fennel seeds, mustard seeds and mustard oil etc. required for standardization of fenugreek seed pickle were also purchased from local market of Kumarganj, Ayodhya.

#### 2.3 Product development

This phase involved the whole idea of development of value added product of raw and germinated fenugreek seed pickle by using different treatment with mustard oil, lemon juice and vinegar.

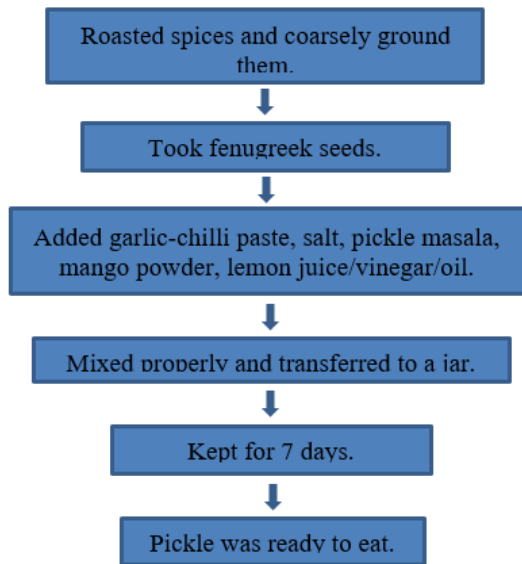


Fig 1: Processing of raw and germinated fenugreek seed pickle

**2.4 Preparation of Recipe**

This phase is mainly deals with preparation of three different variant of pickle

**2.5 Product Development**

Treatment for the preparation of Raw and germinated fenugreek seed pickle

- T1- Pickle in lemon juice
- T2- Pickle in vinegar
- T3- Pickle in oil

**3. Result and Discussion**

**3.1 Sensory Evolution**

Sensory Evolution of therapeutic flour was done by the 5-member panellist.

**Parameter 3.1.1: Colour of fenugreek seed pickle**

Table 1: Individual markings for colour of fenugreek seed pickle

Treatments	Raw Fenugreek Seed Pickle	Germinated Fenugreek Seed Pickle
T1	7.10	8.10
T2	8.10	8.90
T3	7.00	8.10

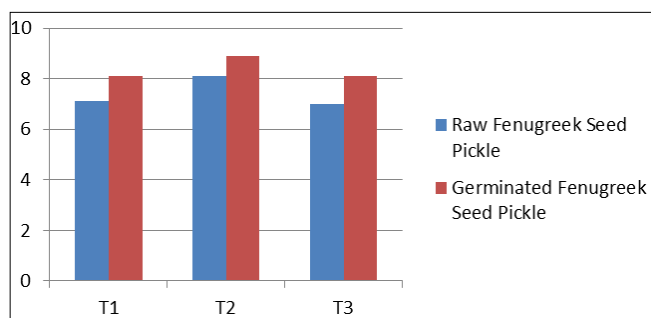


Fig 2: Graphical Representation- colour

It shows that the Sample germinated fenugreek seed pickle is most accepted among the panellist members and it gets highest scoring, then after raw fenugreek seed pickle.

**Parameter 3.1.2: Appearance of fenugreek seed pickle**

Table 2: Individual markings for appearance of fenugreek seed pickle

Treatments	Raw Fenugreek Seed Pickle	Germinated Fenugreek Seed Pickle
T1	7.50	8.10
T2	7.90	8.80
T3	7.10	8.20

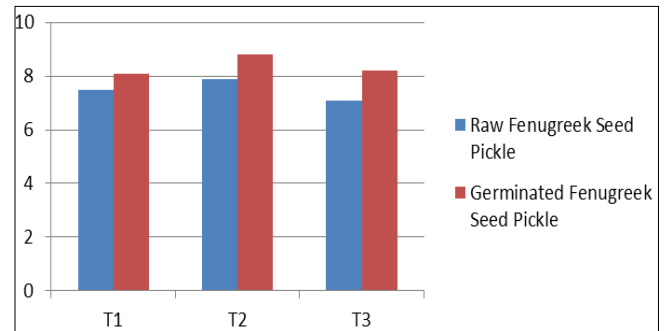


Fig 3: Graphical Representation- appearance

It shows that the germinated is most accepted among the panellist members and it gets highest scoring, then after raw fenugreek seed pickle, respectively.

**Parameter 3.1.3: Aroma of fenugreek seed pickle**

Table 3: Individual markings for aroma of fenugreek seed pickle

Treatments	Raw Fenugreek Seed Pickle	Germinated Fenugreek Seed Pickle
T1	7.00	8.50
T2	7.80	8.90
T3	6.70	7.80

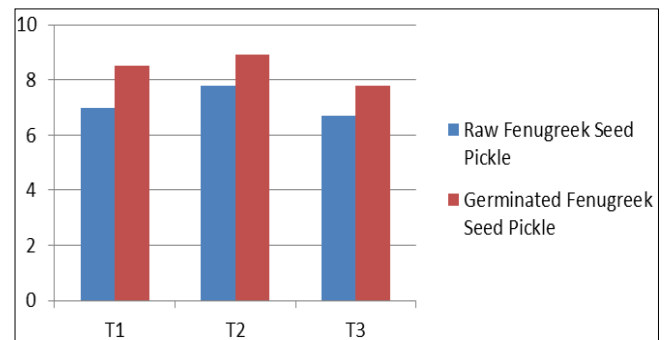


Fig 4: Graphical Representation- aroma

It shows that the germinated is most accepted among the panellist members and it gets highest scoring, then after raw fenugreek seed pickle, respectively.

**Parameter 3.1.4: Texture of fenugreek seed pickle**

Table 4: Individual markings for texture of fenugreek seed pickle

Treatments	Raw Fenugreek Seed Pickle	Germinated Fenugreek Seed Pickle
T1	7.20	8.50
T2	8.20	8.80
T3	6.70	7.70

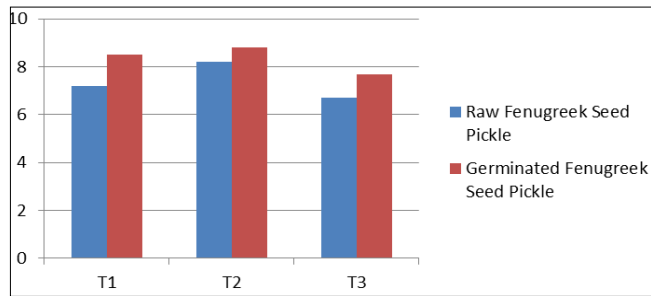


Fig 5: Graphical Representation- texture

It shows that the germinated is most accepted among the panellist members and it gets highest scoring, then after raw fenugreek seed pickle, respectively.

**Parameter 3.1.5: Taste of fenugreek seed pickle**

Table 5: Individual markings for taste of fenugreek seed pickle

Treatments	Raw Fenugreek Seed Pickle	Germinated Fenugreek Seed Pickle
T1	7.10	8.30
T2	8.20	8.70
T3	6.70	7.50

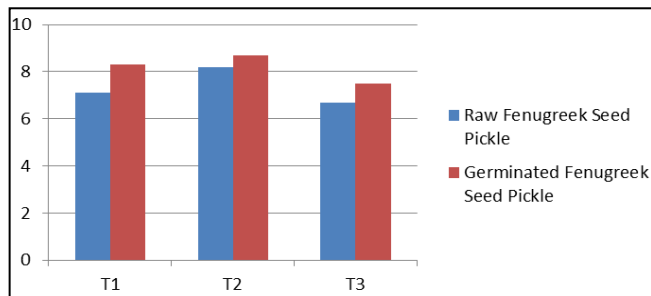


Fig 6: Graphical Representation- taste

It shows that the germinated is most accepted among the panellist members and it gets highest scoring, then after raw fenugreek seed pickle, respectively.

**Parameter 3.1.6: Overall acceptability of fenugreek seed pickle**

Table 6: Individual markings for overall acceptability of fenugreek seed pickle

Treatments	Raw Fenugreek Seed Pickle	Germinated Fenugreek Seed Pickle
T1	7.18	8.30
T2	7.94	8.82
T3	6.80	7.86

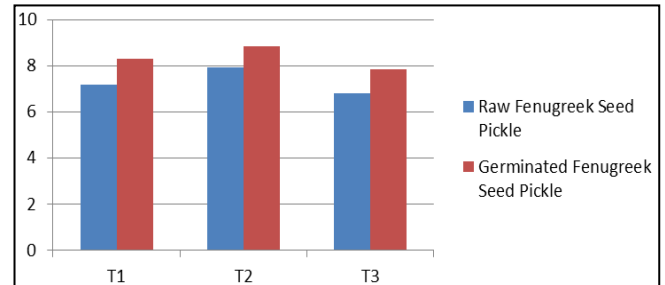


Fig 7: Graphical Representation- overall acceptability

It shows that the germinated is most accepted among the panellist members and it gets highest scoring, then after raw fenugreek seed pickle, respectively. From the above graph it shows that the sample T2 of germinated and raw fenugreek seed pickle is most accepted overall among the sensory panellist members and it gets highest scoring, then after sample T1 and T3, respectively.

**Overall Calculation**

Overall calculation are done to know most acceptability of the product in all terms of quality by sensory evaluation scoring given by the panellist members, in this all scoring of colour, appearance, aroma, texture, taste and overall acceptability are calculated in the table, by this we did statistical analysis and obtained average and other C.D. value (Table 8 & Table 9).

Table 8: Sensory Score of Raw Fenugreek Seed Pickle

S. No.	Treatments	Colour	Appearance	Aroma	Texture	Taste	Overall acceptability
1.	Pickle in Lemon Juice	7.10	7.50	7.00	7.20	7.10	7.18
2.	Pickle in Vinegar	8.10	7.90	7.80	8.20	8.20	7.94
3.	Pickle in Oil	7.00	7.10	6.70	6.70	6.70	6.80
C.D. (0.05)		0.37	0.36	0.35	0.36	0.39	0.39

Table 9: Sensory score of germinated fenugreek seed pickle

S. No.	Treatments	Colour	Appearance	Aroma	Texture	Taste	Overall acceptability
1.	Pickle in Lemon Juice	8.10	8.10	8.50	8.50	8.30	8.30
2.	Pickle in Vinegar	8.90	8.80	8.90	8.80	8.70	8.82
3.	Pickle in Oil	8.10	8.20	7.80	7.70	7.50	7.86
C.D. (0.05)		0.41	0.41	0.41	0.41	0.40	0.44

**3.2 Nutritional Attributes**

Nutritional attributes of raw fenugreek seed pickle was calculated by Food Composition Table (Gopalan *et al.*,

1995) <sup>[10]</sup> and Germinated fenugreek seed pickle was calculated by Calculation method.

Table 10: Nutritional attributes of raw fenugreek seed pickle

S. No.	Treatments	Energy (Kcal)	Protein (g)	CHO (g)	Fat (g)	Fibre (g)	Total Ash (g)	Calcium (mg)	Iron (mg)
1.	Pickle in Lemon Juice	350	26.50	47	6.07	7.71	3.09	181	6.58
2.	Pickle in Vinegar	333	26.20	44	5.8	7.20	3.00	160	6.50
3.	Pickle in Oil	603	26.20	44	35.8	7.20	3.00	160	6.50
C.D. (0.05)		20.27	NS	2.22	1.12	0.36	0.27	8.84	NS

**Table 11:** Nutritional attributes of Germinated Fenugreek Seed Pickle per 100 g

S. No.	Treatments	Energy (Kcal)	Protein (g)	CHO (g)	Fat (g)	Fibre (g)	Total Ash (g)	Calcium (mg)	Iron (mg)
1.	Pickle in Lemon Juice	328	32.64	38	5.00	15.51	6.41	181.20	6.48
2.	Pickle in Vinegar	312	32.34	35	4.73	15.00	6.32	160.20	6.40
3.	Pickle in Oil	575	32.34	35	34.73	15.00	6.32	160.20	6.40
	C.D. (0.05%)	18.11	NS	1.8	1.08	NS	NS	8.85	NS

#### 4. Conclusion

The different treatments of raw and fenugreek seed pickles was done to de-bitter the fenugreek seeds and to improve the nutritional quality of the pickles. Raw and germinated fenugreek seed pickle containing lemon juice and vinegar are most suitable for diabetic and others who want to restrict calories.

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