

# Fenugreek: Phytochemical study, nutritional value and uses

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**Abstract-** The literature on fenugreek's botanical characteristics, productivity, properties, and uses is reviewed in this work. This species originated from seeds and leaves. The agronomic and environmental elements have an impact on the significant production of fenugreek. This species' distinctive characteristics are also influenced by habitat conditions, agricultural techniques, and diversity. The crop fenugreek (*Trigonella foenum graecum* L.) is one of these species. Fenugreek is an eco-friendly plant that is a member of the legume family. The genotype, climate, environmental factors, cultivation methods, fertiliser use, and irrigation all affect plant yields. The seeds had lower levels of zinc, manganese, and copper, but they were higher in biogenic elements like phosphorus, sulphur, magnesium, and calcium. The biologically active compounds (protein, amino acids, biogenic elements, lipids, and fatty acids) found in fenugreek seeds and leaves are utilised in traditional medicine, as

functional food items, and in the cosmetics industry. Fenugreek is used in traditional medicine to make muscle-building supplements, tinctures, meads, water and alcohol extracts, infusions, and tonics with antidepressant and psychotonic effects. Fenugreek is a component of premium dairy cattle feed that enhances the animals' overall health. This review paper's conclusions will be helpful to consumers who want to incorporate healthy biogenic components and fatty acids into their meals in order to improve their health.

**Key words:** *Trigonella foenum-graecum*, chemical compounds, benefits.

## Introduction

Fenugreek (*Trigonella foenum-graecum* L.) is a nutritious food that offers both health benefits and functional properties at an affordable cost. This plant is primarily cultivated in countries such as China, India, Turkey, Canada, Australia, as well as various regions in northern and southern Africa, and southern Europe<sup>[1]</sup>. The seeds of

fenugreek (*Trigonella foenum graecum*) are frequently utilized as a spice in Indian households. These seeds are said to possess nutritional benefits and to promote digestive activity<sup>[2]</sup>. The seeds of fenugreek, a condiment that is frequently utilised in Indian homes, are an essential source of saponins and fibre (50%) particularly gel fibre (20%). These seeds were found to have hypoglycemic effects in a short-term study<sup>[3]</sup>. Greek hay is another name of fenugreek. Its seeds taste a little harsh and smell strongly. The Mediterranean region, Western Asia, and Southern Europe are the native habitats of fenugreek<sup>[4]</sup>. Fenugreek has been utilized for the treatment of colic, flatulence, dysentery, diarrhea, dyspepsia accompanied by loss of appetite, chronic coughing, dropsy, enlargement of the liver and spleen, rickets, gout, and diabetes. Additionally, it is employed for its gastroprotective properties, antiurolithic effects, diuretic function, antidandruff capabilities, anti-inflammatory properties, and antioxidant effects<sup>[5]</sup>. Additionally, it has been noted that fenugreek seeds exhibit significant activity in scavenging free radicals<sup>[6]</sup>. Fenugreek are carbohydrates, dietary fiber, protein, and fats etc<sup>[7]</sup>. In Egypt and nations in the Middle East. the seeds are serve as a flavor enhancer<sup>[8]</sup>. It contain a high fiber content (48%)<sup>[9]</sup>.

### **Preparation of fenugreek seed extract with ethyl alcohol:**

The powdered seeds were finely ground. A total of 10 grams of the seed powder was measured, and 50 milliliters of ethyl alcohol was added to this amount. The mixture was stirred continuously for 30 minutes and then allowed to kept at room temperature for 24 hours before being filtered. The resulting filtered solution was further refined using Whatman filter paper number 3 and was subsequently stored at 4°C for future use<sup>[10]</sup>.

### **Preparation of Solutions**

- a) **Fehling's solution:** firstly take a beaker then mix it with same volume of copper sulphate, sodium potassium tartarate and sodium hydroxide.
- b) **Wagner's reagent:** 2 gm of iodide is taken and mix with 6 gm of potassium iodide in water of 100 ml and mix it properly.

### **Tests**

- a) **Phytochemical screening:** ethyl alcohol is most preferable and mostly used as standard for identifying various residues of the extract in every phytochemical analysis.
- b) **Procedure for alkaloids:** for identifying the presence of alkaloid in the extract, firstly we need to take 2ml of extract and in that Wagner's reagent

(2 ml) is added. A brownish color of precipitate formation was seen which indicates the presence of alkaloids.

- c) **Cardiac glycosides:** for testing the presence of glycosides, 2ml of extract is firstly mixed with 2ml of chloroform after that carefully add concentrated sulphuric acid for forming a layer. Deep reddish brown colour at the interface of steroid ring shows the presence of cardiac glycosides.
- d) **Flavonoids:** To know if flavonoid is present in the seeds, 2ml of extract is taken along with 2ml of 10% lead acetate. Yellowish green colour shows the presence of flavonoids.
- e) **Saponins:** For saponin testing, 2ml of extract is mixed with Benedict's reagent (2 ml). Blue black precipitate shows the presence of saponins.
- f) **Tanins:** for knowing the presence of tannins, firstly 2ml of extract is ~~test~~ with 0.1% of Ferric chloride. Brownish green layers ~~indae~~ the presence of tannins.
- g) **Terpenoids: (salkowski test):** for identifying the presence of terpenoids, 2ml of extract is treated with 2ml of chloroform along with concentrated sulphuric acid to form a layer. A reddish brown colour is seen ~~whih~~ shows the presence of terpenoids.
- h) **Anthraquinones:** To check whether

anthraquinones is present or not in fenugreek seed extract, 1ml of extract is firstly boiled with 10% HCL for few minutes in water bath. Then it is filtered and allowed to cool. Same volume of CHCL<sub>3</sub> is added to the filtrate obtained and few drops of 10% Ammonia is added to the mixture and then it is heated. A rose pink colour is found that indicates the presence of anthraquinones.

- i) **Reducing sugars:** The extract was first shaken with distilled water and then filtered. The filtrate is boiled with Fehling's solution A and B for some time, an orange red precipitates ~~indae~~ the presence of reduced sugars.
- j) **Glycosides:** for identifying this, extract is hydrolyzed with HCL solution and neutralized with NAOH solution. Few drops of Fehling's solution A and B are then added, Red color indicates the glycosides presence.
- k) **Phlobatanins:** The test is for checking the presence of Phlobatanins, the extract is dissolved in distilled water and filtered. The filtrate is boiled with 2% HCL solution. Red precipitate shows the presence of phlobatanins.

## Results and Discussion

**Results of phytochemical analysis:** By this analysis we can conclude that fenugreek seeds consists of Tanins, anthraquinones, flavonoids, alkaloids,

terpenoids, saponins, cardiac glycosides, reducing sugars, phlobatanins, steroids, aminoacids, phenolic and proteins<sup>[11]</sup>.

**Table-1** Phyto Chemical Analysis of *Trigonella foenumgracum* (Methi seeds)

Sl. No	Phytochemicals	Distilled Water	Methanol	Acetone	Ethanol
1	Tanins	Positive	Positive	Positive	Positive
2	Anthraquinones	Negative	Positive	Positive	Positive
3	Flavanoides	Positive	Positive	Positive	Positive
4	Alkaloides	Positive	Positive	Positive	Positive
5	Terpenoids	Positive	Positive	Positive	Positive
6	Saponins	Positive	Positive	Positive	Positive
7	Cardiac glycosides	Positive	Positive	Positive	Positive
8	Glycosides	Positive	Negative	Positive	Positive
9	Reducing Sugars	Positive	Positive	Positive	Positive
10	Phlobatanins	Positive	Positive	Positive	Positive
11	Steroids	Positive	Positive	Positive	Positive
12	Phenolic	Positive	Positive	Positive	Positive
13	Aminoacids	Positive	Positive	Positive	Positive
14	Proteins	Positive	Positive	Positive	Positive
15	Quinones	Positive	Positive	Positive	Positive

### Disclaimer Statement

Authors declare that no competing interest exists. The products used for this research are commonly used products in research. There is no conflict of interest between authors and producers of the product.

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