

## CULTIVATION TECHNOLOGY AND BENEFITS OF FENUGREEK

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### ABSTRACT

Fenugreek (*Trigonella foenum-graecum* L.) is a plant native to the Mediterranean region. The name of the species means "Greek hay" because in the past it was used as a forage plant, another use being that of spice or medicinal plant throughout the world. Fenugreek is one of the oldest medicinal plants, having positive effects on antidiabetic, anticarcinogen, hypocholesterolemic, antioxidant and immunological activities, can also be used as a green fertilizer, enriching the soil with nutrients.

This paper aims to describe the technology of cultivating fenugreek, but also to highlight its main benefits.

### INTRODUCTION

Fenugreek (*Trigonella foenum - graecum* L.), Once known as the Greek hay, is an annual species of the family Leguminosae (Fabacea), which is traditionally used as a forage plant. Moreover, fenugreek can also be used as a green manure, enriching the soil with nutrients.

Both seeds and leaves are used in food. They are used for medicinal purposes, food, spices, dyes and as a fodder plant [14.15]. The leaves are usually eaten cavegetally. Fenugreek leaves contain protein (25.0%), starch (25.9%), neutral fiber detergent (12.9%), gum (4.3%), ash (10.8%) and lipids (6.5 %). I am a rich source of

calcium, iron,  $\beta$ -carotene and other levitamins. The seeds contain 6-10% lipids, 44-59% carbohydrates and 20-30% protein [6].

Fenugreek seeds are hard, yellowish brown and angular. Some are elongated, some rhombic, some practically cubic, with a side of about 3 mm. They are used whole and dried, or in the form of boring yellow powder, ground from roasted seeds. They contain: 8-10% sterol lipids (lecithin, phytin, diosgenin,

other phytosterols); 30% proteins and nucleotides, 20-30% carbohydrates, nitrogenous compounds and others.

The chemical composition of fenugreek seeds and defatted fenugreek seeds is shown in table 1. These seeds are a rich source of fiber and protein. Fibers can be further classified as gum (gel fibers) and neutral fibers. Whole fenugreek seeds also contain 4.8% saponins. Saponins (are steroid glycosides, triterpenes with a high possibility of structural combinations) from fenugreek seeds are steroidal in nature (furostanol type saponins), with diosgenin as the main steroid saponin.

Multiple uses of fenugreek have been discovered since ancient times, in addition to its use as a fodder or natural supplement, it is also used in medicine. Due to its benefits, it is used in the treatment of wounds, abscesses, arthritis, bronchitis, ulcers, diabetes and digestive problems. [17]

**Table 1**  
**Close composition (%) fenugreek seeds [5]**

Composition	Whole seeds	Skimmed seed
Moisture	9.0	9.0
Ash	3.0	3.5
Lipids	8.0	Negligible
Protein	26.0	28.3
Starch	6.0	6.5
Total fiber	48.0	51.7
Gum	20.0	19.2
Neutral detergent fiber	28.0	32.5

The paper presents a brief synthesis of cultivation technology and the benefits of fenugreek.

#### **MATERIAL AND METHOD**

Although fenugreek cultivation is mainly concentrated in some countries in Africa and Asia; however, it is grown worldwide in various environmental conditions. This widespread spread of fenugreek around the globe is the individuality of its adaptation to variable climate. From dry tropical areas to temperate forests, fenugreek can grow well in areas that receive 300-1500 mm of annual rainfall and an average annual temperature of 7.8-27.5 ° C [12].

#### **Cultivation technology for fenugreek**

**Requirements for environmental factors** Fenugreek is especially demanding on temperature, requiring germination above 8°C and withstanding air temperatures higher than 35 °C during vegetation. Humidity requirements are moderate (slightly higher and constant during sunrise). It does not have high demands on the soil, but it is good if it is provided with good conditions: deep, temperate soils, free of weeds, which do not form a crust, with a good supply of nutrients and calcium. It prefers soils with a pH between 5.3 to 8.2. Cultivation areas, fenugreek has no special requirements compared to areas but in

our country the best conditions are found in the south of the country, but the area of favorability can extend to Transylvania and Moldova.

**Crop rotation.** Plants prior to fenugreek cultivation are those plants that leave the land free of weeds. Because schndufol has a short vegetation period and is a soil improver and a nitrogen fixer, it is an excellent precursor crop. However, it is advisable to avoid cultivating other legumes on the same soil as the fenugreek crop for a period of 2-3 years. Fertilization No additional fertilization is required if the soil is well supplied with nutrients, if it has been organically fertilized in recent years. Otherwise, it is recommended that under the autumn plowing to administer an average intake of phosphorus (50-60 kg / ha P2O5) and lower potassium (10-20 kg / ha K2O), possibly the amendment with 100-1500 kg / ha var dust. In the spring, when preparing the germination bed, 25-35 kg / ha s.a. derived from natural fertilizers which do not alter soil pH [11]



**Fig.1. Fenugreek [18]**

**Soil works** Depending on the preceding plant and soil moisture, plowing can be performed in summer or autumn at a depth of 22-25 cm, with the plow in the aggregate with the star harrow. On the lands that do not form a crust, it is recommended to discuss in the autumn, following that in the spring 1-2 days before sowing the preparation of the germination bed will be finalized, with the combine. If for various reasons the work did not take place, it can be prepared in early spring with a disc harrow in the aggregate, with a harrow with adjustable fangs until a level of leveling and crushing is appropriate for crops with medium-small seeds [7]. Seeding and sowing The seed (fig.3) must have a high cultural value, purity of 85-95% and germination capacity of at least 80%. The sowing is performed with the seed drill (for example the seed drill Sup-21/29, fig.2), in the spring as much as possible. The optimal depth is 1-3 cm, the distance between rows of 37.5-50 cm (the lowest value on land clean of weeds), and the amount of seed per hectare of 15-25 kg.

A successful culture must have at rising a density of 200-300 pl / m<sup>2</sup>.



**Fig.2. Sowing machine Sup 29 [20]**

#### **Maintenance work**

Weed control is mandatory because the species has a weak competitive power and on weed-infested lands, harvesting works are difficult and conditioning operations cannot always ensure the elimination of hard-to-separate weeds.

The care works consist of 3-4 mechanical or manual plows, of which the first "blind", for the destruction of the

crust, as well as 1-2 selective weeding when thinning can be done, so that the distance between plants in a row to reach 8 -10 cm.

So far no pests of economic importance for fenugreek have been reported, but production may be diminished due to the attack of the pathogen fusarium oxysporum, which is transmitted through seed and soil. They can cause yellowing and wilting of the plants, followed by the erosion (appearance of rust) of the pods or even the complete drying of the bushes.

**Fenugreek diseases** are generally classified based on their pathogenicity into two broad groups: biological (fungal, bacterial, viral, insect-affected) and mineral nutrient deficiency.

Among the most common biological diseases are leaf spot caused by Pseudomonas, mosaic virus, and insect diseases such as thrips, pod-borers and heliothis.

Deficiency of mineral nutrients,

It has been found that yellowing of fenugreek plants in field conditions is linked to probable mineral deficiencies, especially to elements such as deficiency of boron, magnesium, manganese or potassium. Physiological diseases have been reported to be associated with early death and loss of fodder and fennel seed production [2].

#### **Harvesting**

The best time to harvest is when the pods have started to dry out and the seeds in them have turned yellow.

On small areas the plants are cut with a sickle or plucked, dried and beaten. On large areas, harvesting can be done in two phases (cutting with a mower, leaving in the furrow for a few days and threshing with a combine) or directly with a combine harvester.

In all cases to avoid shaking, the harvesting operation is performed in the morning on dew.

The harvested seeds are immediately passed through selectors to remove impurities, then solarized for a

few days to reach the maximum allowable humidity (12%).



**Fig.3. Fenugreek seeds [19]**

The average yields obtained are 600-1300kg / ha, but by observing all the technological links presented, in favorable environmental conditions, 1800kg / ha can be obtained, which substantially yields the crop.

## **RESULTS AND DISCUSSIONS**

Besides the fact that it is used as animal feed, it has a large number of medicinal properties. Hence the interest in its introduction in the nutraceutical (food supplements) and pharmaceutical industries.

### ***Anticancer potential***

Fenugreek contains a diverse number of chemical constituents, namely steroids, amino acids, vitamins, polyphenolic compounds, etc. These chemicals, which are found in seeds are responsible for some of the reported medicinal properties of the plant, namely antidiabetic, antioxidant, antileukemic, anti-hyperlipidemic, anti-inflammatory, wound healing and gastroprotective, or antidiabetic properties [9]. The estrogenic potential of fenugreek seeds (A study showed that fenugreek seeds) contain phyto-chemicals, saponins that can have an effect on the production of sex hormones and can help the body maintain normal testosterone levels [13].

Recent studies suggest that fenugreek and its active constituents may have anticarcinogenic potential. The

preventive efficacy of dietary fenugreek seeds and its main constituent of steroidal saponin, diosgenin, was evaluated. The study was performed on rats suffering from colon cancer. Based on these findings, the constitutive diosgenin of fenugreek seems to have potential as a new preventive agent of colon cancer [21].

### ***Antioxidant potential and reduction of ethanol***

The raw fenugreek extracts were prepared by the method of extracting soxhelt with various solvents such as methanol, ethanol, dichloromethane, acetone, hexane and ethyl acetate. The results show that all fenugreek extracts have antioxidant activity. These findings suggest that fenugreek extracts may act as a powerful source of antioxidants [8].

### ***Antidiabetic potential***

Fenugreek can increase the number of insulin receptors in red blood cells and can improve the use of glucose in peripheral tissues, thus demonstrating potential anti-diabetes effects both in the pancreas and in other areas [10].

Even recent research on diabetic rabbits has shown the same results [1]. Due to this brilliant pharmacological property of fenugreek, the plant finds its place as an effective therapeutic approach to the management of diabetes in addition to modern medicines.

### ***The gastroprotective potential of fenugreek seeds***

The effect of fenugreek seeds was studied compared to local medicines used to treat ethanol-induced gastric ulcer. The aqueous extract and a gel fraction isolated from the seeds showed significant protective effects against ulcers.

Histological studies have shown that the soluble gel fraction derived from seeds was more effective than the native drug in preventing the formation of lesions. These observations show that fenugreek seeds have anti-ulcer potential [22].

### ***Cholesterol lowering potential***

Fenugreek also has cholesterol-lowering properties. The active principles in this case were the saponins that were detected in the subfraction of the cotyledon and the bridge. These are a powerful agent having the hypocholesterolemic property [4].

#### **Side effects of fenugreek consumption**

Although the multiple benefits of fenugreek have been proven by researchers, there are also side effects of consuming fenugreek namely: due to the high estrogen content, fenugreek has the ability to stimulate the uterus so it should be avoided by pregnant women. Also, although fenugreek has been shown to be an insulin substitute, fenugreek consumption may interfere with insulin therapy [16].

In addition to these benefits since ancient times, fenugreek is also well known as a world culture of spices grown on all continents [2].

#### **CONCLUSIONS**

In conclusion we can say that fenugreek is a plant with a little pretentious cultivation technology and the book easily adapts to environmental conditions around the world. It has been used as a spice since ancient times.

Due to the large number of medicinal properties, fenugreek is an attractive plant for the nutraceutical industries as well as for the pharmaceutical ones.

Being a fodder legume plant and a natural nitrogen fixer it can be easily incorporated into local crop cycles in different geological regions for natural soil replenishment.

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