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## Proximate composition, crude cellulose and minerals of *Trigonella Foenum-Graecum* L. seeds cultured in West Algeria.

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### ABSTRACT

**Background:** Fenugreek (*Trigonella foenum-gracum* L.) is an annual plant in the family Fabaceae, it is one of the most promising medicinal herbs, known from ancient times, having nutritional value too. Its seeds are used for multipurpose beneficial. In our work, four different cultivars of fenugreek seed which is cultured in the National institute of agronomic research (INRA) of Lamtar ( Sidi Bel Abbes, Northwest Algeria) were analyzed for proximate composition, dietary fibre and minerals with Official standard methods of Association of Association of Official Analytical Chemistry. **Objective:** The core objective of this research was to determine and compare the nutrient content of these fenugreek seeds. **Results:** Dry matter, crude protein, lipids content of these fenugreek varieties ranged from 84.85 to 86.70, 21.28 to 22.58 and 4.30 to 5.94 percent respectively. Dietary fibre constituents like crude cellulose varied from 9.27 to 12.09 percent. Minerals, calcium and phosphorus varied from 2.89 to 3.04, 0.10 to 0.16 and 0.12 to 0.16 percent respectively. **Conclusion:** It was found that these seeds are found to be rich sources of calcium and phosphorus. They are a good source of protein, fat and cellulose but with different contents. Thereby, it was concluded that the fenugreek is beneficial to health and to nutrition for consumers of these plant seeds.

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## INTRODUCTION

Healthy herbs have long held an important place in our wellness. Prized since ancient times, and today we even more depend on them to purify our body. Although, the herbs been in use in our diet since antiquity, only recently have taken the center-stage of nutrition scientific world for their potential health benefiting and detoxification properties.

Fenugreek (*Trigonella foenum graecum* L.) is an annual plant from the family of fabaceae, widely cultivated in Mediterranean countries and Asia, as it is a popular food (home remedies) consumed in various ways (Billaud and Adrian, 2001a). The seeds of this plant rich in contain proteins, unsaturated fatty acids and phytoosterols oil, carbohydrates, steroidal saponins, alkaloids, mucilage, vitamins (A, B1 and C) and a wide range of minerals (Billaud and Adrian, 2001a). In addition, the seeds contain saponins (particularly diosgenin) used for medicinal steroids synthesis, steroidal saponins which are responsible for the hypocholesterolemia activity of fenugreek, as well as the free amino acid 4-hydroxyisoleucine (near 80% of free amino acids present in fenugreek seeds) that is responsible for the hypoglycemia activity of fenugreek (Billaud and Adrian, 2001b).

As a spice, fenugreek adds nutritive value to foods as well as flavours (Brasch and Ulbricht, 2003); thus, it is used as a seasoning ingredient in products like artificial maple syrup and rum (Shankaracharya *et al.*, 1973). It is used in many domains, including medicine, nutrition, beverages, fragrances, cosmetics, smoking, and for other industrial purposes (Djeridane *et al.*, 2006). Divers research on the proximate composition of the seeds of *Trigonella foenum-graecum* L. from different backgrounds have been reported, among them which have included the work of (Nazar and Tinay, 2007) on the proximate composition and physico-chemical properties of a concentrate prepared from fenugreek seeds (*Trigonella foenum graecum* L.) proteins (Nazar and Tinay, 2007). Abdel-Nabey and Damir (1990) studied changes of certain nutrients fenugreek seeds in boiling water. The lipid

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composition of fenugreek seeds studied by (Hemavathi and Prabhakar, 1989). Abbas Ali *et al.* (2012) studied characteristics nutrient content seed *Trigonella foenum-graecum* and Kochhar *et al.* (2006) studied Proximate Composition, Available Carbohydrates, Dietary Fibre and Anti Nutritional Factors of this plant. The aim of the present study to determine and compare **nutritional value** in various parameters such as **dry** matter, protein, lipid, cellulose and minerals of the four local varieties cultivated in West Algeria.

#### Methodology:

##### Sampling method:

The seeds of four fenugreek varieties grown in the same agro-ecological conditions at the National Institute of Agronomic Research (INRA) in Lamtar (Sidi Bel Abbes, Algeria Northwest) and were collected in June 2013 respectively. These are varieties 0057, 1063, 1138 and 2087.

##### Proximate chemical composition:

Official standard methods of analysis of Association of Official Analytical Chemistry (AOAC, 1990) were used for proximate chemical analysis of fenugreek seeds.

##### Determination of dry matter:

The content of moisture and therefore dry matter was determined as described in the (AOAC, 1990).

##### Determination of Crude Protein:

Total nitrogen content of a 1 g ground seed sample was determined using the micro-Kjeldahl method and the conversion factor of 6.25 was used to calculate the crude protein content (AOAC, 1990).

##### Determination of Crude cellulose:

The assay of the crude cellulose obtained after successively processing the plant material with sulfuric acid and potassium hydroxide by the method of Kurschner and Hoffner (Lazouni *et al.*, 2007).

##### Determination of lipids:

Lipid content was estimated by the method of Bligh and Dyer using a solvent mixture of chloroform and methanol (2:1 v/v) (Bligh and Dyer, 1959).

##### Analysis minerals:

Determination of minerals made with the acid digestion of the samples and analyzed following the procedures described by AOAC, (1990).

##### Determination of calcium and phosphorus:

Calcium was determined using an atomic absorption spectrophotometer while phosphorus was determined by colorimetric method using vanadomolybdophosphoric acid method (AOAC, 1990).

##### Statistical analysis:

All experiments were performed once. The data was subjected to way Analysis of variance (ANOVA 1) using Microsoft Excel 2007 for to compare the nutrient content the four fenugreek varieties. Differences were considered significant when the p-values were less than 0.05.

#### Results:

The proximate chemical compositions (dry matter, crude protein, crude cellulose and lipid), minerals (calcium and phosphorus) of fenugreek samples were presented on dry matter basis in table (1).

**Table 1:** Nutrient and minerals contents of fenugreek seeds.

Fenugreek varieties	Parameters (%/g dry weight)						
	Dry matter	Crude protein	Lipids	Crude cellulose	Minerals	Calcium	Phosphorus
0057	84,85	22,58	5,94	9,27	3,00	0,14	0,12
1063	86,25	22,26	5,59	9,96	3,04	0,14	0,16
1138	85,65	21,28	4,30	12,09	2,89	0,10	0,14
2087	86,70	21,40	4,32	11,58	3,00	0,16	0,14

#### Discussion:

Dry matter content of fenugreek varieties ranged from 84.85 % for 0057 variety to 86.70 % for 2087 variety were lower than the reported value of 94,11% for (Atta *et al.*, 2012). Crude protein was found to be 21.28, 21.40, 22.26, and 22.58 % in 1138, 2087, 1063 and 0057; respectively. These values were less than 33,33% and

31,6% reported for (Abdelnasir *et al.*, 2013) and (Surya Acharya *et al.*, 2006). It is also to be noted that digestibility in rat has decreased with increasing protein and dry matter of fenugreek seed in their diet. This indicates that a judicious use of fenugreek seed in diet may be helpful for those who have no symptoms of allergy as such (Meghwal Goswami, 2012).

Lipid content of the 0057 and 1063 varieties were 5.94% and 5.59% respectively which were significantly higher than 4.32% (2087) and 4.30% (1138) while the difference between 2087 and 1138 was not significant. The lipid compositions were lower than the range 6.53%, 7.9% and 9.84% that were reported by (Kochhar *et al.*, 2006; Ziwar, 2009; Waleed, 2009); respectively.

Crude cellulose composition of 12.09 for 1138 was found to be the highest followed by 11.58% for 2087, 9.96% for 1063 and the least was 9.27% for 0057. The results for the four varieties were higher than the 1.46% that of reported by (Kochhar *et al.*, 2006). The contents were found to be different in some elements from what has been reported in the literatures. Such variation in nutrient contents may be related to the variations of cultivated regions, storage conditions and maturity stage. It may also be due to geographical and climatic differences where the sample seeds had been grown (Atta, 2003; Abbas Ali *et al.*, 2012).

The mineral compositions of fenugreek seeds varied from 2.89% to 3.04%. Calcium content also varied according to seed types from 0.10 to 0.16 %. The results are higher than 0.0108% that of reported by (KUMARAVEL and Alagusundaram, 2014). Phosphorus content varied from 0.12% to 0.16%. The values for phosphorus were lower than 0.29% that of reported by (KUMARAVEL and Alagusundaram, 2014). As the result of mineral compositions in this study indicates, fenugreek is rich in calcium and phosphorus. Therefore, fenugreek can be an important food ingredient to be used in food fortifications enhancing micronutrient supplementations to alleviate the hidden hunger, micronutrient deficiency, of the African children and the poor people as whole.

#### Conclusion:

In addition to their hypoglycemic action, fenugreek seeds are good source of protein, lipids, crude cellulose and minerals, that appear to have a very positive effect on human health. our study shows that this plant contains a high nutritional value, leads us to educate local populations up to use the plant foods and it would be desirable to further study, is to the valorization of this plant in the animal field.

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