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Physico-Chemical Properties of Different Varieties of Fenugreek Seeds

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ABSTRACT

The study entitled Nutritional evaluation and value addition of fenugreek seeds (*Trigonella foenum graecum*) was undertaken to determine the physico-chemical quality of five varieties of fenugreek seeds namely, NDM-120, NDM-116, NDM-80, NDM-2 and NDM-1. The samples were procured from Vegetable Seed Farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya. Physical parameters of grain were determined. The thousand grain weight of variety NDM-120 was maximum (14.06) followed by NDM-116 (13.43), NDM-80 (11.90), NDM-1 (11.90) and NDM-2 (10.82). Bulk density and per cent porosity of varieties varied significantly and ranged from 0.78 to 0.81 (g/dl) and 34.93 to 40.18 (%). The chemical composition of varieties determined. Moisture content was maximum in NDM-116 (7.53) and minimum in NDM-80 (6.59). Protein content was maximum in NDM-2 (39.2%) and minimum in NDM-1 (21.97%).

Keywords

Varieties, Crude protein, Crude fibre, properties

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Introduction

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

This spice occupies third place in area and fourth in production among all the major seed spices grown in this country. In India, its

cultivation is concentrated mainly in Rajasthan. This state has a share of 83 per cent of the total fenugreek production in the country. Other states cultivating fenugreeks are Gujarat, Tamil Nadu, Uttar Pradesh, Himachal Pradesh, Madhya Pradesh, Andhra Pradesh and Punjab (Spice India, 2012).

Over 80 per cent of the world's production of this seed is contributed by India, one of the major producer and exporter of fenugreek in the world (Hooda and Jood, 2002).

The seeds are golden-yellow in color, small in size, hard and had four-faced stone like structure (Altuntas *et al.*, 2005).

The average length, width and thickness of fenugreek seeds and single seed mass and diameter ranged from 4.01 to 4.19, 2.35 to 2.61, 1.49 to 1.74 mm, 0.0157 to 0.0164 g and 2.40 to 2.66 mm (Zgo *et al.*, 2006).

Its seeds contain 25.2 to 30.1 per cent protein, 7.2 to 9.3 per cent lipids, 20.1 to 25.3 per cent insoluble fibre, 20.4 to 30.2 per cent galactomannan and 5.3 to 7.3 per cent saponins along with ample amounts of volatile oils, free amino acids, mucilaginous fibre and flavonoids (Raju and Bird, 2006).

The leaves and seeds of fenugreek are consumed in different countries around the world for different purposes such as medicinal uses anti diabetic, lowering blood sugar and cholesterol level, anti-cancerous, anti-microbial etc., making food like stew with rice in Iran, flavor cheese in Switzerland, syrup and bitter rum in Germany, mixed seed powder with flour for making flat bread in Egypt, curries, dyes, young seedlings eaten as vegetables etc., roasted grains as coffee substitute in Africa, controlling insects in grain storages and in perfume industries etc. (Srinivasan, 2006).

The diosgenin content of fenugreek helps in lessening certain effects of menopause, such as hot flashes or mood swing. Its seeds have been used since long time in treating certain reproductive and hormonal disorders, facilitate breast enlargement and reduce the problem of menstrual pain.

People suffering from sour throat or acid reflux experience relief by taking fenugreek. The use of fenugreek seeds is very useful in maintaining the level of both cholesterol and blood sugar.

It is found to be effective in treating diabetes (Verma, 2014).

Materials and Methods

The five varieties of fenugreek seeds namely NDM-1, NDM-2, NDM-80, NDM-116 and NDM-120 released by Narendra Deva University of Agriculture & Technology were collected from vegetable seed farm of Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh. Seeds were cleaned to remove any extraneous material. The physic-chemical properties were recorded by using the standard methods.

Physical Parameters of different varieties of fenugreek seeds

Colour

The colour of randomly selected fenugreek seeds was recorded by visual appearance.

1000 seed mass (grams)

The triplicate samples of one thousand raw fenugreek seeds of different varieties were counted randomly, and weighed separately to record the test weight of 1000 grains and expressed in grams.

Bulk density (g/ml)

The fenugreek seeds were poured in a vessel of known volume, from a constant height. The mass of the sample occupying that volume was determined and bulk density was calculated and expressed as g/ml.

Density

It was determined by the kerosene oil displacement method (Bhattacharya *et al.*, 1972).

Measured quantities of samples were added in a graduated vessel containing sufficient kerosene oil. The volume displaced due to addition of 10g sample was recorded. The density was determined by dividing the weight of fenugreek seeds with the volume displaced.

Porosity

The treatment – wise porosity was calculated as under:

$$\text{Porosity (\%)} = \frac{\text{Density} - \text{Bulk density}}{\text{Density}} \times 100$$

Chemical Composition of different varieties of fenugreek seeds

Samples were analyzed for their chemical compositions namely moisture, crude protein, crude fat, crude fibre, dietary fibre, total ash and dry matter using standard methods (AOAC, 2000). Carbohydrate was calculated by calculation method. Formula of carbohydrate is given below:

$$\text{Carbohydrate (\%)} = 100 - (\text{Moisture} + \text{Crude protein} + \text{Crude fat} + \text{Crude fibre} + \text{Total ash})$$

Energy was calculated by factorial method.

Formula of energy is given below:

$$\text{Energy (Kcal)} = 4x \text{ Carbohydrate} + 4x \text{ Crude protein} + 9x \text{ Crude fat}$$

Statistical analysis

Each experiment was replicated three times. The data were analyzed for percentage, mean and single factor Analysis of Variance (ANOVA) was applied to find the appropriate significant difference among the different foods.

Results and Discussion

Physical parameter of different varieties of fenugreek seeds

The physical parameter of different varieties of fenugreek seeds is depicted in Table 1.

The colour of seeds of variety NDM-120 was Dijon yellow, NDM-116 was pale gold, NDM-80 was pale brown, NDM-2 and NDM-1 was pale yellow in colour. The thousand grain weight of variety of NDM-120 was maximum i.e. 14.06 followed by NDM-117 (13.43), NDM-80 (11.90), NDM-1 (11.90) and minimum in NDM-2 (10.82). Bulk density and per cent porosity of varieties varied significantly and ranged from 0.78 to 0.81 (g/dl) and 34.93 to 40.18 (%), respectively.

Table.1 Physical parameters of selected varieties of fenugreek seeds

| S.No. | Parameters | Varieties | | | | | C.D. (0.05) |
|-------|----------------------|--------------|-----------|------------|-------------|-------------|-------------|
| | | NDM-120 | NDM-116 | NDM-80 | NDM-2 | NDM-1 | |
| 1. | Colour | Dijon yellow | Pale gold | Pale brown | Pale yellow | Pale yellow | - |
| 2. | 1000 kernel Mass (g) | 14.06 | 13.43 | 11.90 | 10.82 | 11.90 | 1.01 |
| 3. | Density (g/dl) | 1.30 | 1.28 | 1.25 | 1.32 | 1.25 | NS |
| 4. | Bulk Density (g/dl) | 0.80 | 0.78 | 0.80 | 0.81 | 0.78 | 0.52 |
| 5. | Porosity (%) | 40.18 | 38.80 | 34.93 | 38.12 | 37.06 | 1.77 |

Plate.1 Fenugreek seeds of selected varieties



Table.2 Chemical composition of selected varieties of fenugreek seeds

| S. No. | Parameters | Varieties (V) | | | | | Mean |
|--------|---------------|---------------|---------|--------|-------|-------|-------|
| | | NDM-120 | NDM-116 | NDM-80 | NDM-2 | NDM-1 | |
| 1. | Moisture | 7.17 | 7.53 | 6.50 | 6.84 | 6.82 | 6.97 |
| 2. | Crude Protein | 25.05 | 25.60 | 27.91 | 39.20 | 21.97 | 27.94 |
| 3. | Crude Fat | 7.42 | 10.48 | 5.25 | 10.47 | 9.31 | 8.57 |
| 4. | Crude Fibre | 15.49 | 14.82 | 14.01 | 15.02 | 15.10 | 14.89 |
| 5. | Dietary Fibre | 24.61 | 21.87 | 20.17 | 20.59 | 20.86 | 22.02 |
| 6. | Total Ash | 5.85 | 5.91 | 5.80 | 5.70 | 5.95 | 5.85 |
| 7. | Dry Matter | 92.81 | 92.47 | 93.50 | 93.17 | 93.18 | 93.03 |
| 8. | Carbohydrates | 39.00 | 36.00 | 41.00 | 23.00 | 39.00 | 36.00 |
| 9. | Energy | 323 | 341 | 321 | 342 | 333 | 332 |

Chemical composition of different varieties of fenugreek seeds

The chemical composition of different varieties of fenugreek seeds is depicted in Table 2.

There was statistically significant difference among the various varieties. Maximum moisture content was found in NDM-116 (7.53%) and minimum in NDM-80 (6.50%). Protein content of fenugreek seeds varied between 21.97 to 39.20 per cent significantly. Variety NDM-116 and NDM-2 contained maximum fat i.e. 10.48 and 10.47 per cent. It was followed by NDM-1, NDM-120 and NDM-80 and respective values were 9.31, 7.42 and 5.25 per cent. Crude fibre content of NDM-120, NDM-2, NDM-116, NDM-1 and NDM-80 were 15.49, 15.02, 14.82, 14.55 and 14.01 per cent, respectively. Maximum dietary fibre content was found in variety NDM-120 followed by NDM-116, NDM-1, NDM-2 and NDM-80 and respected values were 24.61, 21.87, 20.86, 20.59 and 20.17 per cent, respectively.

Maximum ash content was found in NDM-1 followed by NDM-116, NDM-120, NDM-80 and NDM-2. The respective values were 5.95, 5.91, 5.85, 5.8, and 5.7 per cent. The maximum dry matter was found in NDM-80 (93.50%) followed by NDM-1 (93.18%), NDM-2 (93.17%), NDM-120 (92.81%) and NDM-116 (92.47%). The higher carbohydrate content of NDM-80 was 41 per cent followed by NDM-120 and NDM-1 (39%), NDM-116 (36%) and NDM-2 (23%). The energy content of different varieties ranged between 321 to 342 Kcal per 100 g.

Fenugreek seeds used as condiment in most part of India have been reported to have pharmacological, medicinal and therapeutic properties such as anti-diabetic, anti-tumour, anti-viral and anti-oxidant properties. Among

various varieties NDM-120 and NDM-116 had superior grain quality. The chemical quality of different varieties reflected highest protein in NDM-2, highest crude fibre and dietary fibre in NDM-120.

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