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Seasonal Variation in Phytochemical Profile of *Trigonella Foenum-Graecum L*

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Abstract

The seasonal variation of phenol, tannin and ascorbic acid content has been investigated from leaves, stem, root and seeds of *Trigonella foenum-graecum*. Comparative account of phenol contents of *Trigonella foenum-graecum* showed higher level in leaves (range 4.973 to 5.102 mg/g dry wt.) than stem (range 2.704 to 3.019 mg/g dry wt.), root (range 1.006 to 1.123 mg/g dry wt.) and seeds (3.116 mg/g dry wt.). Comparative account of tannin contents of *Trigonella foenum-graecum* showed higher level in leaves (range 0.321 to 0.398 mg/g dry wt.) than stem (range 0.234 to 0.312 mg/g dry wt.), root (range 0.102 to 0.156 mg/g dry wt.) and seeds (2.745 mg/g dry wt.). Comparative account of ascorbic acid contents of *Trigonella foenum-graecum* showed higher level in leaves (range 2.785 to 3.276 mg/g dry wt.) than stem (range 1.698 to 2.109 mg/g dry wt.), root (range 0.831 to 1.076 mg/g dry wt.) and seeds (1.734 mg/g dry wt.).

Keywords: Phenol; Tannin; Ascorbic acid; *Trigonella foenum-graecum*

Introduction

Since the ancient times, nature has been a huge source of medicinal agents. All over the world, plants have served as the richest source of raw materials for traditional as well as modern medicine [1,2]. The medicinal value of plants is mainly due to the presence of some chemical substances known as photochemical. They are basically plant metabolites, are synthesized in all parts of plant body itself and have some definite physiological action on animals [2,3]. In view of the increasing demand for protein and energy to support the growing world population, researchers have directed their efforts at exploring new and nonconventional sources of food that grow in the different regions of the world. Nature has bestowed upon us a very rich botanical wealth and a large number of diverse types of plants grow wild in different parts of our country. The important constituents of diet are carbohydrates, fats, proteins, vitamins, minerals and water [4]. Every constituent plays an important role and deficiency of any one constituent may lead to abnormal developments in the body. Plants are the rich source of all the elements essential for human beings.

Trigonella foenum-graecum is commonly known as fenugreek (English). *Trigonella foenum-graecum* is

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reported to contain several active chemical constituents such as alkaloids, saponins, steroids, tannins, flavonoids, amino acids and trigonilline. The plant has been scientifically used for the treatment of wounds, inflammation, gastrointestinal ailments, as cholesterol lowering agent, diabetes, bronchitis, inflammation, chronic cough, liver disorder and as an anti-fertility agent. *Trigonella foenum-graecum* is one such plant that has been extensively used as a source of anti-diabetic compounds from its seeds, leaves and extracts in different model systems [5-7]. Fenugreek is traditionally used in India, especially in the Ayurveda and Unani systems [8,6]. The seeds possess anti-diabetic potentials [9].

Materials and Methods

The plant material of *Trigonella foenum-graecum* were collected from our botanical garden, during different season's viz. summer, monsoon and winter continuous two years for estimation of phenol, tannin and ascorbic acid.

Total phenols

The concentration of total phenols in the plant extract was determined by using Folin method [10]. Catechol was used as standard. 0.2 ml ethanolic (80%) extract (4 mg/ml) of plants and 0.2 ml Folin reagent were mixed thoroughly. After 4 min, 1 ml of 15 % sodium carbonate was added and the mixture was allowed to stand for 2 hours at room temperature. The absorbance was measured at 760 nm. The concentration of total phenols was measured equivalent to Catechol (as a standard drug) by using standard calibration curve of Catechol.

Total tannins

Total tannin in plant extract was determined by Folin–Denis method [11]. 0.5 g of powdered drug was boiled for 30 min with 75 ml of double distilled water. It was cooled, centrifuged at 2000 rpm for 20 min and supernatant was collected in 100 ml volumetric flask and the volume was made up with double distilled water. 1 ml of this solution was transferred to a 100 ml volumetric flask containing 75 ml water and 5 ml of Folin–Denis reagent + 10 ml of sodium carbonate solution were added and diluted up to 100 ml with water. After shaking, the absorbance was read at 700 nm after 30 min. Blank solution was prepared with water instead of the sample. Standard graph was prepared by using 0-100μg of tannic acid. Total tannin content of the sample was measured equivalent to tannic acid by standard graph.

Ascorbic Acid

Total ascorbic acid content in plant extract was determined by method [12]. 2 g dried powdered sample was extracted with 4% oxalic acid and the volume was made up to 100 ml. It was centrifuged at 1000 rpm for 10 min. 5 ml supernatant liquid was transferred to a conical flask and 10 ml of 4 % oxalic acid was added. It was titrated against standard dye solution (2, 6-dichlorophenolindophenol) to a pink end point. The procedure was repeated with a blank solution (without adding sample). 5 ml ascorbic acid of 100 ppm was used as standard. Ascorbic acid content was calculated using the formula.

Results and Discussion

The phenol content of leaves was higher (5.102 mg/g dry wt.) in summer over than winter (5.002 mg/g dry wt.) and monsoon (4.973 mg/g dry wt.). The range of phenol content of stem was from (2.704 mg/g dry wt. to 3.019 mg/g dry wt.). The range of phenol content in root was from 1.006 mg/g dry wt. to 1.123 mg/g dry wt. and show higher in summer. The phenol content of root was very low in all season. The phenol content of seeds was higher (3.116 mg/g dry wt.) as compared to leaves, stem and roots of all seasons. The phenol content showed increasing order of root < stem < leaves < seeds. The Tannin content of leaves was 0.398 mg/g dry wt. in summer, 0.354 mg/g dry wt. in winter and 0.321 mg/g dry wt. in monsoon, higher being observed during summer i.e. (0.914 mg/g dry wt.). The range of tannin content in stem (0.234 mg/g dry wt. to 0.312 mg/g dry wt.). Maximum concentration of tannin was noted during summer (0.312 mg/g dry wt.). The range of tannin content of root was low from (0.102 mg/g dry wt. to 0.156).The tannin content of seeds was higher (2.745 mg/g dry wt.) as compared to leaves, stem and roots of all seasons. Generally, the concentration of tannin were found to be in increasing order of root < stem < leaves < seeds (Table 1 & Figure 1).

The ascorbic acid concentration of leaves was higher in summer (3.276 mg/gm dry wt.) over that of monsoon (2.785 mg/gm dry wt.) and winter seasons (2.985 mg/gm dry wt.). The stem of ascorbic acid concentration was ranging from (1.698 mg/gm dry wt. to 2.109 mg/gm dry wt.) and significantly higher in summer (2.109 mg/gm dry wt.). The ascorbic acid content of root was comparatively low (0.831 mg/gm to 1.076 mg/gm). The amount of ascorbic acid found in seeds from (1.734 to 3.116 mg/gm dry wt.) in all seasons (Table 1 & Figure 1).

S. No.	Plant Parts	Season	Phenol (mg / g dry wt.)	Tannin (mg / g dry wt.)	Ascorbic acid (mg / g dry wt.)
1	Leaves	Summer	5.102	0.398	3.276
		Monsoon	4.973	0.321	2.785
		Winter	5.002	0.354	2.985
2	Stem	Summer	3.019	0.312	2.109
		Monsoon	2.704	0.234	1.698
		Winter	2.892	0.271	1.874
3	Root	Summer	1.123	0.156	1.076
		Monsoon	1.006	0.102	0.831
		Winter	1.067	0.123	0.948
4	Seeds	--	3.116	2.745	1.734

Table 1: Seasonal variation of phenol, tannin and ascorbic acid levels of different plant parts of *Trigonella foenum-graecum* L.

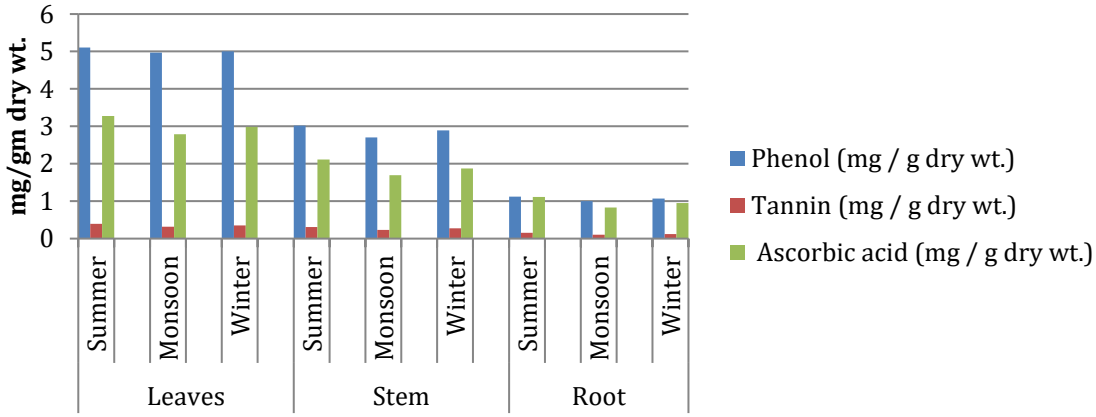

Figure 1: Seasonal variation of phenol, tannin and ascorbic acid levels of *Trigonella foenum-graecum* L.

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