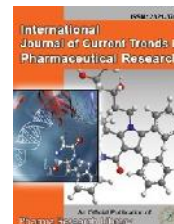




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Research Article

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Biochemical Evaluation of Ash Values of *Trigonella foenum-graecum* Linn.

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ABSTRACT

The seasonal variation of total ash, acid soluble ash, acid insoluble ash, water soluble ash and water insoluble ash have been investigated in leaves, stem and roots of *Trigonella foenum-graecum* Linn. Comparative account of total ash of leaves showed (range 10.261 to 10.862 %), stem (8.234 to 9.133 %) and roots (9.785 to 11.226 %). Comparative account of acid soluble ash showed higher level in leaves (range 8.300 to 8.800 %) than stem (7.521 to 7.894 %) and roots (7.563 to 8.100 %). The acid insoluble ash showed higher level in roots (2.222 to 2.327 %) as compared to leaves (2.024 to 2.070 %) and stem (1.211 to 1.239 %). The water soluble ash and water insoluble ash showed higher level in roots (4.952 to 5.211%), (5.477 to 6.015 %) respectively compared to stem and leaves.

Keywords: Total ash, water soluble ash, acid insoluble ash, *Trigonella foenum-graecum*

ARTICLE INFO

CONTENTS

1. Introduction	242
2. Materials and Methods	243
3. Results and discussion	243
4. References	245

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1. Introduction

All human beings required a number of complex organic/inorganic compounds in diet to meet the need for their activities. The important constituents of diet are carbohydrates, fats, proteins, vitamins, minerals and water (Indrayan *et. al.*, 2005). According to New Wall *et. al.*, (1996), 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. The phytochemical constituents and medicinal properties of most of the medicinal plants were recorded in the last decades by a number of workers (Nadkarni, 1976 ; Nudrat and Usha, 2005). These medicinal plants are subjected to various processes and are then administered to the patients. The survey and documentation of medicinally important plants in each and every place is very much important for

easy identification of local traditional healers, conservation and sustainable utilization.

Nature has been a source of medicinal agent for thousands of years and an impressive number of modern drugs have been isolated from natural sources. Medicinal plants have been used as traditionally for numerous human diseases for thousands of year morbidity throughout the world. Thus, their treatment by using medicinal plant is an important public health issue. Medicinal properties of plants are due to the active chemical constituents present in different parts of the plant (Mitscher, *et. al.*, 1980; Kadam *et. al.*, 2015).

Plants have always played a major role in the treatment of human traumas and diseases worldwide (Principe *et. al.*, 1991) .They have been used as sources of modern drugs, either by providing pure compounds , starting materials for partial synthesis of useful compounds or models for synthesis of drugs (Hansel, 1972). According to the World Health Organization (WHO) as much as 80% of world's population depends on traditional medicine for their primary health care needs (Azaizeh *et. al.* 2003). Ash is the substances that remain after burning an organic substances; it contains almost all macro- as well as micronutrients except organic carbon and nitrogen. Gopalan *et.al* (1992).

Fenugreek (*Trigonella foenum-graecum* L.), plant is widely distributed throughout the world and which belongs to the family Fabacecae. Use fenugreek for head colds, influenza, catarrh, constipation, bronchial complaints, asthma, emphysema, pneumonia, pleurisy, tuberculosis, sore throat, laryngitis, hay fever and sinusitis. Fenugreek has been used to treat peptic ulcers and inflamed conditions of the stomach and bowel, it absorb toxic material and eliminate it. The nourishing seeds are given during convalescence and to encourage weight gain, especially in anorexia. Helpful in lowering fever, it is compared to quinine by some authorities. The seeds soothing effect makes them of value in treating gastritis and gastric ulcers. The seeds freshen bad breath and help restore a dulled sense of taste. The oil in the seeds is used as a skin softener and emollient. In China, the fenugreek seeds are used as a pessary to treat cervical cancer.

2. Materials and Methods

The plant materials of *Trigonella foenum-graecum* collected from our botanical garden and field during different seasons viz. summer, monsoon and winter. The leaves stem and root samples are collected and kept separately, dried under shade and prepared powder of leaves, stem and root with grinder simultaneously.

Determination of Ash Values:

Attempt was also taken to study the behavior of powder of plant material with certain chemical reagent as describe by in Pharmacopoeia of India (Anonymous, 1966), and British Pharmacopoeia (Anonymous, 1973) were followed for determining Ash value.

Preparation of Ash: 3gm of drug was incinerated in a Silica crucible over the burner. The charred material was heated in muffle furnace for six hours at 60-65°C. The ash

was found white and free from carbon. It was cooled and weighed on the ash less filter paper

Determination of Acid-Insoluble Ash:

The acid was boiled for 5 minutes with 25ml of dilute hydrochloric acid. Insoluble matter collected in crucible or on an ash less filter paper and washed with hot water, ignited and weight. Percentage of acid insoluble ash was calculated with reference to the air dried drug.

Determination of Water-Insoluble Ash

The water was boiled for 5 minutes with 25ml of dilute water. Insoluble matter collected in crucible or an ash less filter paper and washed with hot water, ignited and weighed. Weight of the insoluble matter was subtracted from the weight of ash. The difference in weight represents the water soluble ash. Percentage of water soluble ash was calculated with reference to the air dried drug.

3. Results and discussions

Ash values were determined with a purpose to find out the total amount of inorganic solutes present in the medicinal plant material. Quite a few herbal therapies make use of ash. It is very obvious that ash of any plant does not contain any organic material and therefore. Inorganic salts are used medicinally. It is also interesting to know about the different solubility of the components of ash. Therefore, the solubility of ash in water and hydrochloric acid was tested in the present study.

A) Determination of acid insoluble ash: The total ash of leaves of *Trigonella foenum-graecum* were ranges from 10.342 % to 10.862 %, higher level of total ash was found in summer season (10.862%) than winter (10.523%) and monsoon (10.342 %). Total ash of stem showed highest level in summer season (9.133 %) as compared to winter (8.906 %) and monsoon (8.732 %). Total ash of root showed highest level in summer season (10.427 %), than winter (10.080 %) and monsoon (9.785 %). The percentage of total ash were found to be in the increasing order of leaves < root < stem (Table No. 1 and Graph No 1).

The range of acid soluble ash content of leaves of the said plant was ranging from 8.300 % to 8.800 % among different seasons tested. Stem showed lowest level of acid solubility of ash content (i.e.7.521 % to 7.894 %) compare to leaves and root. Highest level was recorded in summer season (7.894 %), than winter (7.671 %) and monsoon (7.521 %). Root showed higher level of ash soluble in acid at summer season (8.100 %), than winter season (7.817 %) and monsoon (7.563 %) The percentage of acid solubility of ash were found to be in the increasing order of the leaves < root < stem (Table No. 1 and Graph No 1).

Acid insolubility of ash of leaves of *Trigonella foenum-graecum* was highest in season winter (2.070%) as compared to monsoon (2.042%) and summer (2.062%). The range of percentage of acid insoluble ash of stem showed the range of (1.211% to 1.239 %). Root showed in the range of (2.222% to 2.327%). In root, acid insolubility of ash showed higher level in summer season (2.327%) than monsoon (2.222%) and winter (2.263 %). The percentage of acid insoluble ash content were found to be in the

increasing order of leaves < root < stem (Table No. 1 and Graph No 1).

B) Determination of water insoluble ash:

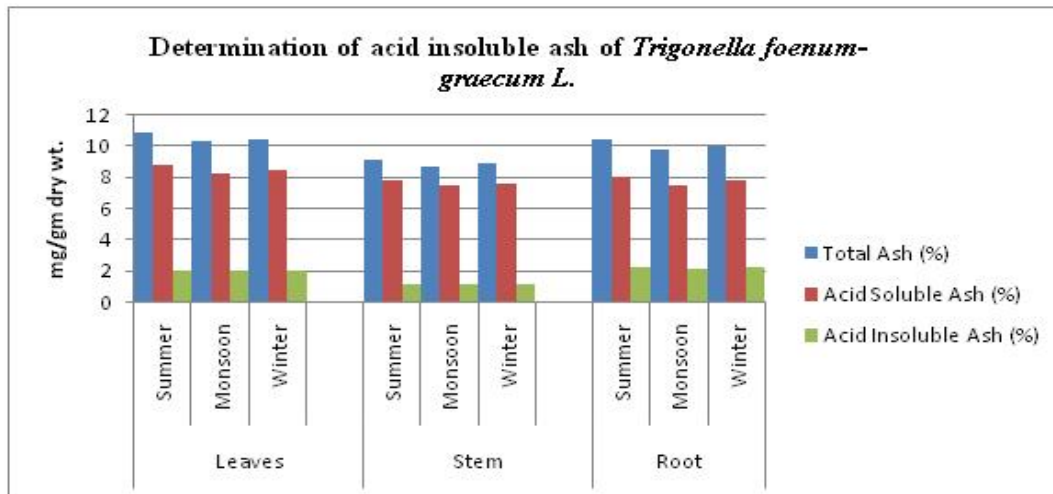
The total ash content of leaves ranges from 10.134 % to 10.600 %. Higher level during summer (10.600%), than Monsoon (10.134 %) and winter (10.261 %).The total ash content of stem was higher level at summer (8.931 %) than winter (8.400 %) and monsoon (8.234 %). The total ash content of root was higher level noted at summer (11.226 %) than monsoon (10.429 %) and winter (10.780 %) respectively. The percentage of total ash found to be in the increasing order leaves <stem< root (Table No. 2 and Graph No. 2). The range of water soluble ash content of leaves was ranging from 4.506 % to 4.833 %, highest solubility observed at summer 4.833 % than monsoon 4.506 % and

winter 4.582 %. Stem showed higher level of water soluble ash at summer (3.956 %) over than winter (3.476 %) and monsoon (3.459 %). Root showed high water soluble ash at summer (5.211 %) than in monsoon (4.952 %) and winter (5.042 %).

The percentage of ash solubility in water to be increasing order as leaves< stem< root (Table No. 2 and Graph No. 2). The range of water insolubility ash content is in leaves 5.628 % to 5.767 %. In stem winter shows higher water insoluble ash content in summer (4.975 %) as compared to monsoon (4.775 %) and winter (4.924 %). In root show higher level of water insolubility at summer (6.015 %) than winter (5.738 %) and monsoon (5.477 %) The percentage of water insolubility to be in the increasing order of leaves<stem <root (Table No. 2 and Graph No 2).

Table 1: Determination of acid insoluble ash of *Trigonella foenum-graecum L.*

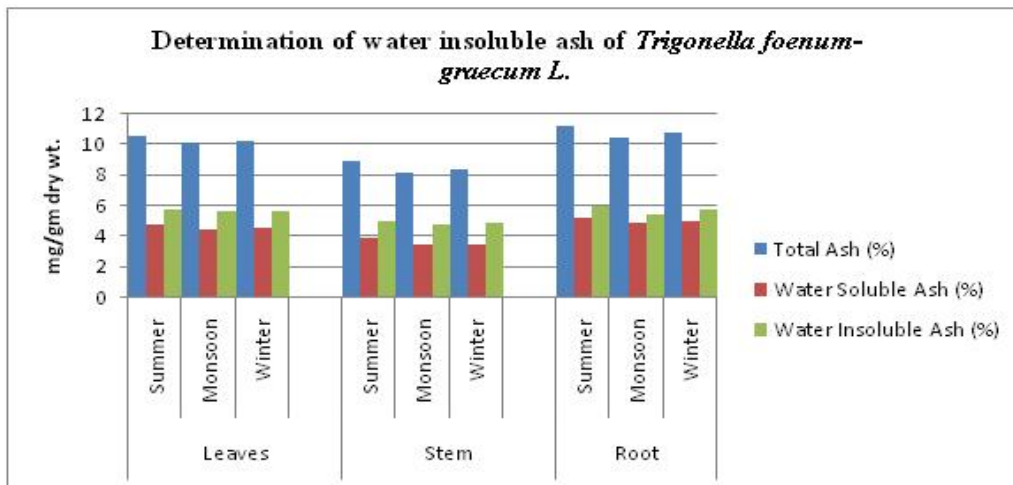
S.No.	Plant Part	Season	Total Ash (%)	Acid Soluble Ash (%)	Acid Insoluble Ash (%)
1	Leaves	Summer	10.862	8.800	2.062
		Monsoon	10.342	8.300	2.042
		Winter	10.523	8.468	2.070
2	Stem	Summer	9.133	7.894	1.239
		Monsoon	8.732	7.521	1.211
		Winter	8.906	7.671	1.235
3	Root	Summer	10.427	8.100	2.327
		Monsoon	9.785	7.563	2.222
		Winter	10.080	7.817	2.263



Graph No. 1

Table 2: Determination of water insoluble ash of *Trigonella foenum-graecum L.*

Sr.No.	Plant Part	Season	Total Ash (%)	Water Soluble Ash (%)	Water Insoluble Ash (%)
1	Leaves	Summer	10.600	4.833	5.767
		Monsoon	10.134	4.506	5.628
		Winter	10.261	4.582	5.679
2	Stem	Summer	8.931	3.956	4.975
		Monsoon	8.234	3.459	4.775
		Winter	8.400	3.476	4.924
3	Root	Summer	11.226	5.211	6.015
		Monsoon	10.429	4.952	5.477
		Winter	10.780	5.042	5.738



Graph No. 2

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