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ELEMENTAL COMPOSITION & PHYTOCHEMICAL CONSTITUENTS OF *SKIMMIA LAUREOLA*

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ABSTRACT

Herbal medicines have a strong traditional or conceptual base and the potential to be useful as drugs in terms of safety and effectiveness leads for treating different disease. In the present Study, an attempt was made to explore the therapeutic potential of *Skimmia laureola*. The inorganic elements play an important role in physiological process involved in human health. Element (major and trace) present in the leaves were quantitatively investigated by inductive coupled plasma mass spectroscopy against salt standards. Phytochemical test were carried out to determine the presence of bioactive constituents qualitatively. The results show that the leaves of skimmia laureola are rich in chemical constituents. Elemental analysis of *Skimmia laueola* leaves has shown that the plant is a rich source of K, Ca, Mg, Fe, Al, and Na which can play vital roles in health and treatment of diseases.

Key words: Minerals (Macro or trace), Phyto chemicals, Herbal medicine, ICPMS.

1.0 INTRODUCTION

Nature has provided a complete storehouse of knowledge of drug. Knowledge of herbs has been handed down from generation to generation for thousands of years. Plants have been as an alternative source of medicine from ancient times. These plants are widely used to treat many diseases due to their mild features and side effects [1, 2]. Herbs not only provide chemicals of medicinal values but also nutritional minerals and trace elements. These are the elements which are required by human body for numerous biological and physiological processes [3] that are necessary for the maintenance of health and proper growth of the body. There are basically 17 important elements required for good health, which are derived from

plants. These elements are present in various concentrations in different parts of the plants. The traditional medicinal plants used into preparation of various drugs, singly or in combination or even as the principal source of raw material material for other medicines [4].

Skimmia is a genus of four species of evergreen shrubs and small trees in the Rue family, Rutaceae, all native to warm temperate regions of Asia. The leaves are clustered at the ends of the shoots, simple, lanceolate, the flowers are in dense panicle clusters, each flower small. All parts of the plant have a pungent aroma when crushed[5] .The botanical name, *Skimmia,* is a Latinization of *shikimi* Illicium (which is the Japanese name for *Illicium religiosum* as well as an element in *miyama shikimi.* The plant is also grown as an ornamental plant. The leaves are edible and used as condiment. The berries are eaten by birds, which disperse the seeds through their droppings. Plant is distributed from northern China to the Northern Himalayas [6, 7, 8].

The leaves are used in the treatment of smallpox [9]. The smoke produced by burning them is said to purify the air. An essential oil in the leaves is used in scenting soap. The dried leaves are used as incense. The fresh leaves are used to make garlands for weddings. Wood - used to make handles of small farming implements such as hoes and axes [10, 11].

2.0 MATERIAL & METHODS

2.1 Collection and Identification of Plant Material: The plant sample of *Skimmia laureola* were collected from a local herbal garden in Dehradun. The plant sample was authenticated by DR. R.P. Kala, Head, Department of Forestry, UCTBMS, Dehradun. The voucher specimen was submitted at herbarium. The fresh leaves of the plant were separated from stems and dried in shade at room temperature in the laboratory and then crushed to coarse powder. The dried material was stored in air tight poly bag till further use.

2.2 Experimental Procedure

2.21 **Elemental composition**: An air dried 5 gm powder was digested in 25 ml conc. nitric acid in hot plate until the volume of the sample reduced to about 1/5 of the original. The digested residues were dissolved in 40 ml acid mixture (250 ml HNO_3+ 25 ml conc. H_2SO_4 + 10 ml $HClO_4$) and heated on hot plate until the reddish brown fumes disappeared. This residue was dissolved in dilute HNO_3 and the volume was made up to 100 ml in a volumetric flask. The filtrate was used for the determination of elements by inductive coupled plasma optical mass spectroscopy (ICPMS, Perkin Elmer SCIEX ELAn DRCe). In this method, the instrument was calibrated with standard reference solution of known concentration, to plot

the standard curve, after which the clear digested sample was aspired into the machine to determine the mineral components [12, 13].

2.22 **Solvent Extraction**: In order to extract active constituents from all the plant samples, powdered leaves of the plants were weighed (300 gm, O.D. basis) and were transferred to the thumble of soxhlet apparatus. Plant material was extracted with following solvents petroleum ether, chloroform, ethanol, hot water in soxhlet apparatus for 8-10 hours. After the completion of every extraction, the extracts were dried under pressure. The extracts were stored for further activity.

Percentage yield of the crude extracts were calculated with the formula

$$\textit{Percentage of yield} = \frac{\textit{Weight of Extract (gm)}}{\textit{Weight of powder are taken (gm)}} \times 100$$

2.23 Phytochemical Analysis: The term 'Phyto' means the plants, so as the name indicates phytochemicals are the chemicals which are derived from the plant sources. Alkaloids, Terpenoids, Coumarins, Tannins, Quinones, Flavonoids, Glycosides, Steroids, Saponins etc. are some classes of phytochemicals. They play different role in plants but they are biologically active as well and are used to cure various ailments [14,15]. The different solvent extracts of Skimmia laueola were tested for their phytochemical contents. It includes test [16] for Alkaloids, Terpenoids, Coumarins, Tannins, Quinones, Flavonoids, Glycosides, Steroids, Saponins etc.

3.0 RESULTS AND DISCUSSION

3.1 **Elemental composition**: The results of elements (Macro and Trace) present in leaves of *Skimmia laueola*, are tabulated in table1.0.

Table: 1.0 Elemental composition of *Skimmia laueola* leaves

S.No.	Element	Symbol	Quantity (ppm)
1	Manganese	Mn	62
2	Magnesium	Mg	2379
3	Iron	Fe	157
4	Calcium	Ca	4217
5	Sodium	Na	29
6	Potassium	K	9628
7	Aluminium	Al	78
8	Boron	B	28
9	Zinc	Zn	18
10	Strontium	Sr	114.5

Elemental analysis of *Skimmia laueola* leaves has shown that the plant is a rich source of K, Ca, Mg, Fe, Al, and Na. The inorganic elements play an important role in physiological process involved in human health. Ca, K, and Mg are required for repair of worn out body cells, strong bones and teeth in humans, building of red blood cells and for body mechanisms ([17]).

Potassium (K) is important as diuretic and it takes part in ionic balance of the human body and maintains tissue excitability. Potassium is the principal intracellular cation and also considered as a very important constituent of the extracellular fluids. Potassium ions are concerned with the transmission of electrical impulse in the nerve cells and in maintaining the fluid balance of the body. Sodium and potassium take part in ionic balance of the human body and maintain tissue excitability, carry normal muscle contraction. Calcium (Ca) imparts strength and rigidity to bones and teeth. Calcium ions are also needed in neuromuscular transmission, excitability of nerves, and clotting of blood and promoting muscular contraction ([18]). Iron (Fe) is responsible for building of tendons and ligaments. It is also important for maintaining healthy immune system. Iron is essential for blood as it is an essential part of hemoglobin. Its deficiency can cause anemia. Aluminum (Al) is now thought to be involved in action of a small number of enzymes. The body has hard time ridding itself of excess aluminum. Magnesium (Mg) prevents some heart disorders and high blood pressure and is associated with improved lung function. It helps in absorbing calcium and phosphorus. It is essential to control insulin levels in blood. It is injected in veins in acute heart or asthma attack situations. Magnesium is effective in treating numerous heart/lung diseases.

Trace elements such as Mn, Fe, and Zn are essential in enzymes metabolism. The concentrations of these elements in plants are quite important. Zinc (Zn) maintain various reactions of the body, which help to construct and maintain DNA, required for growth and repair of body tissues, important element of ligaments and tendons([19]).

3.2 Phytochemical Analysis

3.21 Yield: Percentage yield of the crude extracts were calculated with the formula:

$$\textit{Percentage of yield} = \frac{\textit{Weight of Extract (gm)}}{\textit{Weight of powder are taken (gm)}} \times 100$$

The Percentage yield of different solvent extract of *Skimmia laueola* leaves is reported graphically in fig 1.0.

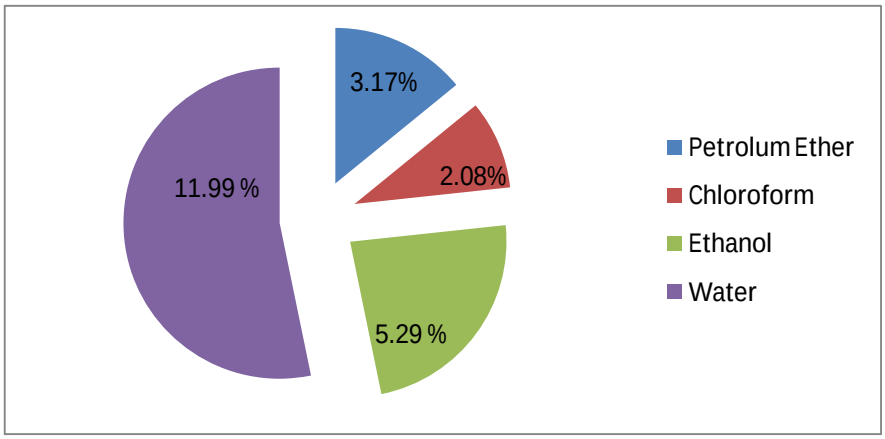

Fig: 1.0 Graphical Representation of Solvent Extract Yield

The result of extraction shows that highest percentage yield found in aqueous medium followed by in Ethanol extract.

3.22 Phytochemical Test

The results of various phytochemical are tabulated in table2.0

Table: 2.0 Phytochemical test of different solvent extract of *Skimmia laueola* leaves

Phytochemical Test	*Petroleum Ether*	*Chloroform*	*Ethanol solvent*	*Aqueous*
Carbohydrates	-	-	+	+
Proteins and amino acid	-	+	+	-
Steroids	+	+	+	-
Alkaloids	-	+	+	-
Glycosides		+	+	+
Phenol and flavonids	+	+	+	+
Tannins	-	+	+	-
Terpenoids	-	+	+	+

(+ for present, - for absent)

On observing the table 2.0, it can be concluded that the leaves of *Skimmia laureola* contain bioactive chemicals. Almost all the phytochemicals i.e. steroids, alkaloides, glycosides are present in chloroform extract and ethanol extract.

4.0 CONCLUSION

The appreciable concentrations of minerals such as sodium, potassium, calcium and magnesium obtained in the plant are interesting. It showed that the plant holds tremendous promise in providing the variable secondary metabolites and mineral supply that could

enhance the curative process of ill health. These finding provide quantitative estimation of the phytochemicals as well as mineral element analysis, which are important in understanding the pharmacological and/or toxicological actions of medicinal plants. This plant is suitable to meet the human body requirement as an important supplement. The elemental analysis by ICPMS indicates the presence of elements in different concentration. All these elements have vital importance in human's metabolism and that they are required for growth, prevention, and treatment of various diseases. The data obtained in present study will be helpful in the synthesis of new modern drugs with various combinations of plants which can be used in the cure of many diseases ethno medicinally. Therefore the plant can be used in the treatment of various diseases. However, more detailed analysis of chemical composition of these medicinal plants is required to be done. The present study shows that the plant material possesses potential chemical constituents. Among the different solvent extract ethanol extract is rich in phytochemical constituents.

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