

Mineral Elements Content in Ayurvedic Medicinal Plants by Absorption & Emission Spectroscopic Method

Shailaja Mahadappa¹ and B R Kerur^a

¹Department of Physics, Govt. First Grade College, Basavakalyan, Karnataka, India

^a Controller of Examination, Central university of Karnataka, Kadaganchi, Aland Road, Kalaburagi-585367, India

^a Corresponding author: E-mail: kerurbrk@gmail.com

ABSTRACT

The Flame Atomic Absorption Spectrometer (FAAS) is analytical or radiation source instrument is utilizing for the quantitative elemental analysis of any materials. The elements are very intermediate substances of any materials and medicinal plants, human body which plays an important role. Hence it is very essential task to study the mineral elements in the material like Ayurvedic Leafy vegetable medicinal plants for maintaining the life processes. In this present study attempts to estimate the level of essential elements in Nine Green leafy Ayurvedic vegetable medicinal plants viz, *Anethum graveolens*, *Colocasia*, *Coriander Coriandrum sativum*, *Curry Leaves*, *Fenugreek*, *Gongura*, *Mentha*, *Scallion plant* and *Spinacia oleracea* collected from different places of Bidar district of Kallyana- Karnataka state. The preparation and analysis of samples were carried out as per the guidance of WHO. Here, total 11 essential elements like Mg, Al, K, Cr, Mn, Fe, Cu, Zn, As, Hg, and Pb are observed at less toxicity and high nutrition. The average concentrations of all observed elements were absorbed in between 19.36 mg/L to 0.03 mg/L. So, present studied all elemental content undergoes the WHO/ FAO/ NMPB permissible limits. Further the resultant data useful for the materialistic study in Science and technology.

Keywords: Medicinal plants, Kallyana-Karnataka, permissible Limits, Elements and Instrument.

1. INTRODUCTION

The abundance of mineral elements was absorbed by measuring quantities of chemical elements present in the Ayurvedic medicinal plants using Flame Atomic Absorption Spectrometry (FAAS) process. In this process atoms absorb ultraviolet or visible light and make transitions to higher energy levels. Atomic absorption method measures the amount of energy in the form of photons of light that are absorbed by the sample [1, 2]. A detector measures the wavelengths of light transmitted by the sample, and compares them to the wavelengths which originally passed through the sample. A signal processor then integrates the changes in wavelength absorbed, which appear in the readout as peaks of energy absorption at discrete wavelengths [2, 3]. Ayurvedic medicine is the oldest form of health care of peoples and also used as Primary health care since there easy of accessibility nearby the home or gardens etc. People use to help to the unhealthy people by taking them to grounds or the nati vaidya houses where in the nati vaidya expert

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is to apply the medicinal plants by rubbing, grinding, mixing in a systematic way and ask the patient to drink along with water/goat milk in the early morning or apply the medicine to the wound area [3, 4]. As mentioned in the Ayurvedic books, medicinal plants can be used to cure all the deceases including cancer/HIV/body pain/chronic deceases/malfunctioning of the organs/ stones in kidney and gallbladder etc, without any operations. Historically the Indian herbal medicinal plants /Ayurvedic medicinal plants are plants using in Ayurveda mainly as medicine purposes [5,6]. The Charaka, Susruta & Vagbatta are main classical text books of AYUSH system of medicine, for the treatment & study the different properties of medicinal plants are described in detai [6, 7]. Ayurvedic medicinal plants classified according to their properties like Rasa, Guna, Virya, Vipaka, and this is help us how to manage/ work on medicinal plants to cure diseases. Ayurveda says vitiation/abnormal increase in Vata, pitta & kapha are main cause of disease [8, 9, 10]. In this region the ATUSH system of medicine till today it is working and developing in modern medicine system. This has been continuous practice in India and other countries for long time and recently uses of medicinal plants applicability has been increasing, because of easy accessibility and highly economical in all respects [11, 12, 13].

2. MATERIALS AND METHODS

2.1 Ayurvedic Medicinal plants materials:

The selected nine green leafy Ayurvedic medicinal plants collected accordingly WHO/FAO/NMPB guidelines and each sample collected in between the distance of 3km to 5km surrounding of different places of Bidar district Humanbad and Bhalki taluka which are lies in Kallayana- Karnataka [14, 15]. From the literature the Bidar district situated in the Easter latitude - longitude is 76° 37' - 76° 55' and Northern latitude - longitude is 17°15' - 17°28' respectively [16, 17]. In the present study total nine fresh water leafy vegetables Ayurvedic medicinal plants, nearly 1/2 kg of fresh leaves samples collected from the respective places and which are collected as per the knowledge of folk parcticensers. The list of samples shown in below table1 and the figure 1 shows the samples images [16, 18].

Table.1 Details of Green Leafy Vegetables Ayurvedic medicinal plants

Code	Botanical Name	Common name	Part Collected
Ans1	Anethum graveolens	Sabasi palaya	Leaves
Coa2	Colocasia	Shavipallya	Leaves
Ccm3	Coriander Coriandrum sativum	Kotanmbari	Leaves
Cus4	Curry Leaves	Karibenva	Leaves
Fek5	Fenugreek	Methi	Leaves
Goa6	Gongura	Fundi palya	Leaves
Mea7	Mentha	Pudina	Leaves
Sct8	Scallion plant	Hasi ullagadi	Leaves
Spa9	Spinacia oleracea	Palak	Leaves

Figure: 1 Nine Leafy Vegetable Ayurvedic medicinal plants images

		
Anethum graveolens	Colocasia	Coriander Coriandrum sativum
		
Curry Leaves	Fenugreek	Gongura
		
Mentha	Scallion plant	Spinacia oleracea

2.2 Preparation and analysis:

The standard procedure of WHO and other AYUSH system of medicinal plants the collected the leafy vegetables at 1/2kg, and washed with a distilled water to remove the clay and mud then dried in the airtight lab at room temperature for 20 days. The dried leaves part were mechanically powdered using a mixer grinder and finally sheaved with a mesh of size 355 μm to get a fine powder and then stored in an airtight polythin plastic. The sample solution was prepared by adopting standard instrumental sample preparation procedure i.e dried part + AR grade conc.- H_2SO_4 + Double Distilled water (1:10:90=100 ml) and finally 100 ml solution was subjected to the analysis of major, minor and trace elemental content [7, 8]. Flame Atomic Absorption Spectroscopy. (Dept. of USIC Gulbarga University) Model-Thermo scientific iCE 3000 Series spectroscopy. It is operated over on SOLAR window software and the flame types are Air- C_2H_2 Air-acetylene flame and N_2O - C_2H_2 , Nitrous oxide- acetylene flames with different wavelength (180-900nm) of the elements. Elemental concentration s calculated on the basis of Beer-Lamberts Law, it is the relation between absorbance and concentrations of an absorbing liquid solution [9, 10]. Detection limits: Flame Type: Air- C_2H_2 Air-acetylene flame and N_2O - C_2H_2 , Nitrous oxide-acetylene flame, Band pass: 0.5nm, Unit: mg/L, Burner height: 7.0mm, Al and Cr elements Burner height: 11.0mm and 8.0mm, Al and Cr elements Flame Type: N_2O - C_2H_2 . The instruments Atomic Absorption Spectrometer is Absorption Spectroscopy, in this method the Hollow-Cathode Lamp used as a source, Emits light of specific wavelength to be absorbed by the elements [11, 12].

3. RESULTS AND DISCUSSION

The result of the present study, is examine the 11 different mineral elemental namely Mg, Al, K, Cr, Mn, Fe, Cu, Zn, As, Hg, and Pb in 9 different families Leafy Vegetable Ayurvedic Medicinal plants. The below table 2 show the data of the mineral Elements in various proportions and the resultant variation of mineral elemental concentrations in Ayurvedic medicinal plants is mainly associate to the differences in botanical structure, as well as in the mineral composition of the soil in which the plants are cultivated. Other factors responsible for a variation in elemental content are preferential absorbability of the plant, use of fertilizers, irrigation water and climatologically conditions.

Potassium (K) elemental content varied under 12.17 mg/L to 19.36 mg/L in Ans1 to Spa9, which is the highest range of elemental content comparably to the other 10 elements and potassium is improve the immunity power to human body. Similarly, second highest of Magnesium (Mg) and Aluminum (Al) in third higher content elements. Further micro or trace elements viz. Manganese (Mn), Iron (Fe), Copper (Cu) and Zinc (Zn) elements. Similarly the measured toxic elements Arsenic (As) and Lead (Pb) are found in very low content respectively show in the below table2. The resulting variations of elemental content found to be within the permissible limits of WHO/FAO, national and international board of medicinal plants. In the present study Ayurvedic medicinal plant green leaf samples contain essential mineral elements and nutrients at an acceptable level; further it helps to study the phytochemical analysis, carbohydrate study and proteins study are studied by others. Similarly, the present studied medicinal plants contain high metabolic activity and biological process of human and medicinal plants because of all Ayurvedic leafy vegetables are contained the high nutrition with less toxicity effect.

Table 2. Essential elemental content in Leafy Vegetables Ayurvedic Medicinal plants (in ppm).

Code no	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
BAns1	1.25	1.45	19.36	0.09	0.09	0.75	0.03	0.2	0.05	0.24	1.56
BCoa2	0.52	0.64	17.25	0.04	1.05	3.01	0.23	0.14	0.02	0.09	1.26
BCcm3	1.11	0.97	16.20	0.04	0.20	1.70	0.02	0.07	0.06	0.30	1.46
BCul4	1.12	1.32	13.33	0.10	0.08	0.85	0.07	0.3	0.09	0.33	1.53
BFek5	0.98	1.50	16.11	0.08	0.12	1.05	0.02	0.07	0.02	0.30	1.40
BGoa6	1.14	1.22	17.12	0.14	0.15	0.45	0.04	0.13	0.07	0.21	1.43
BMea7	1.27	1.61	15.74	0.06	0.10	0.78	0.06	0.07	0.05	0.22	1.47
BSct8	1.23	1.25	15.56	0.12	0.13	0.95	0.09	0.31	0.06	0.32	1.36
BSpa9	2.20	0.35	12.17	0.05	0.30	0.96	0.05	0.10	0.04	0.15	1.44

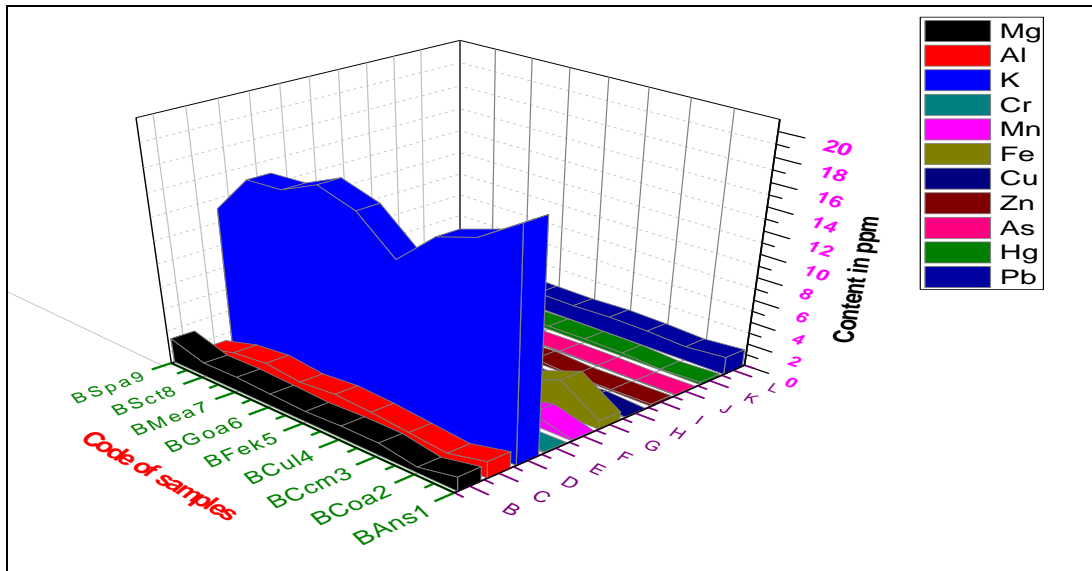


Figure2: 3D cubic graph of the elemental content in nine samples

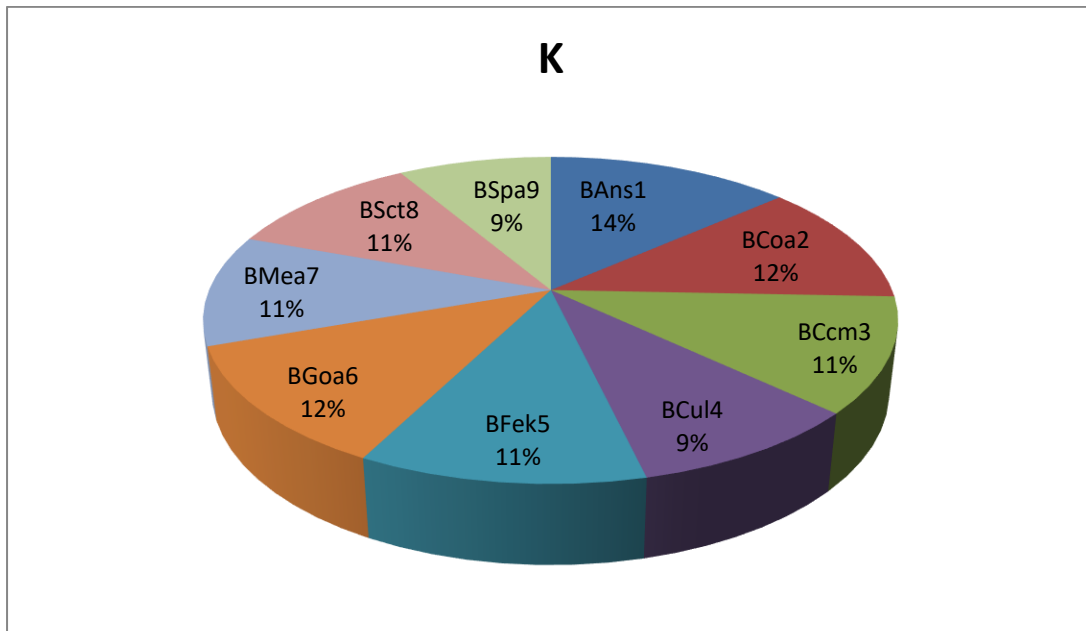


Figure: 3 Pie graph of the Potassium (K) in nine green leafy medicinal plants

The above figure 3 notes that 3D cubic graph along x-axis Code of the samples, z-axis elements and y-axis content of elements. The potassium concentration found in high content in all studied 09 samples, geographically red in color of Bidar soil, so it contains rich potassium content and remaining all studied elements were normalized in permissible limits and figure 3 shows that the percentage variation of Potassium (K) in all nine samples.

4. CONCLUSION

The present investigation provides the information on the elemental concentrations of Ayurvedic medicinal plants in Kallyana-Karnataka regions of Bidar districts. Total 09 different family Ayurvedic medicinal plants collected and examined by using high efficient fluorescence methods such that FAAS instrument. Moreover, the present analysis represents that all detected elements are shown within the permissible limits of WHO/FAO/NMPB and some other standard permissible limits of medicinal plants. Present studied data it is useful to the new researchers, medicinal practitioners to prepare new health drugs and promote the society. Knowing of elemental content which are helps to live a healthy life i.e, multi vitamin, Anti-body and anti-fungal improvement and to build a strong immunity power and protect from infection of virus. The secondary metabolite of the medicinal plants and the human body also helps to study the phytochemical compounds, which have some antimicrobial properties. The analyzed elemental concentrations' viz., Mg, Al, K, Cr, Mn, Fe, Cu, Zn, As, Hg, and Pb are under the limits of national and international medicinal plants quality control bodies' viz., WHO/FAO.

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