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Analysis of Elements in Medicinal Plants

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ABSTRACT

The elements are intermediate substances of medicinal plants and human body which play an important role in the treatment of different diseases. Hence it is necessary to study the essential elements in medicinal plants for maintaining the life processes in plants and/or animals including human beings. India is a rich country for the use of Ayurvedic medicinal plants treatment and also the Kalyan-Karnataka districts boost an unparallel diversity of medicinal plants. The present study attempts to estimate the level of elements in Ayurvedic medicinal plants. Here, total 09 green leafy vegetable Ayurvedic medicinal plants are taken namely Anethum graveolens, Colocasia, Coriander *Coriandrum sativum,* Curry Leaves, Fenugreek, Gongura, Mentha, Scallion plant and *Spinacia oleracea* from Bidar, Kalaburagi and Yadgir districts of Kalyan-Karnataka *region, which* are commonly used as home remedies. The solution samples were prepared for the analytical study of medicinal plants material. The total 11 elements like Mg, Al, K, Cr, Mn, Fe, Cu, Zn, As, Hg and Pb, are determined in different family Ayurvedic medicinal plants. The Flame Atomic Absorption Spectrometer (FAAS) is analytical or radiation source instrument and it is useful for the quantitative analysis of materials. The Results found by this present investigation shows Al has more concentration in all samples. The effect of toxicity is very low in all 09 medicinal plant leaves samples and the elemental concentrations of samples depends on geological soil formation of earth and water.

Keywords: Ayurvedic medicinal plants, Kalyan-Karnataka, WHO Limits, Elements and Instrument.

INTRODUCTION

The term "medicinal plants" refers only to those plants that have therapeutic qualities that can be beneficial to health, produce appropriate medications and treat a variety of illnesses in living beings. The word medicinal plant stands for the value of medicine and significant uses. It includes various types of names like herbalism, herbology and herbal medicine; the word ‘herb’ is derived

from Latin.According to the World Health Organization 80% of world population utilize the medicinal plant materials. Generally, plants contain compounds that provide useful drugs to optimize the metabolites process and therapeutic purposes.

MATERIALS AND METHODS

Ayurvedic Medicinal plants materials:

The selected Ayurvedic medicinal plants were collected from Bidar, Kalaburagi and Yadgir districts of Kalyan-Karnataka *region*. In the present study, nearly 1/2 kg of fresh leaves sample were collected from the selected medicinal plants of the respective places. In this present study, total 09 Ayurvedic medicinal plant leaves samples selected by the knowledge of folk practitioners and are shown in below table.

Table1. Details of Green Leafy Vegetable Ayurvedic medicinal plants

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

Sample Preparation:

The collected leaves of plant samples were washed with distilled water to remove clay, sand, dust, etc., The cleaned samples were dried in the airtight lab at room temperature for 30 days. The dried leaves of the plants 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 polyethene

plastic. The sample solution was prepared by adopting standard procedures: One gram measured powder medicinal plant sample was added in the ratio of 01:10:90=100 ml, that is AR grade conc.- H_2SO_4 + Double Distilled water, here 100 ml solution subjected to the analysis of major, minor and trace elements.

Data Analysis:

This work is carried out using Flame Atomic Absorption Spectroscopy. (Dept. of USIC Gulbarga University) Model-Thermo scientific iCE 3000 Series spectroscopy. which operates over SOLAR window software and the flame types are Air- C2H2 Air-acetylene flame and N_2O-C_2H_2, Nitrous oxide- acetylene flames with different wavelength (180-900nm) of the elements. Elemental concentrations calculated on the basis of Beer-Lamberts Law, which is the relation between absorbance and concentrations of an absorbing liquid solution. 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. In this Atomic Absorption Spectrometer Hollow-Cathode Lamp is used as a source, emits light of specific wavelength to be absorbed by the elements.

Table 2. Essential elemental content in Fresh Water Leafy Vegetables Ayurvedic Medicinal plants (in ppm) in Bidar region

Code No.	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
BAns1	1.25	1.45	29.36	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
BCus4	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

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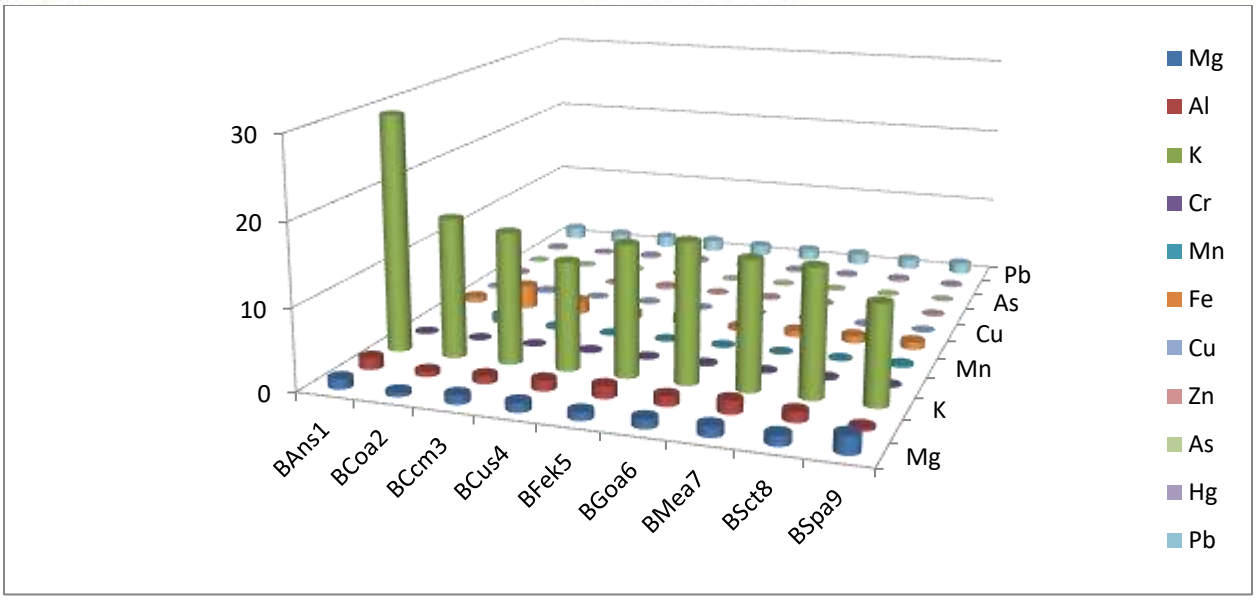

Bar graph of elemental variations in Bidar Samples

Table 3. Essential elemental content in Fresh Water Leafy Vegetables Ayurvedic Medicinal plants (in ppm) in Kalaburagi region

Code No.	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
KAns1	2.20	0.08	13.88	0.02	0.11	0.47	0.05	0.07	0.02	0.24	1.61
KCoa2	0.66	1.99	13.22	0.05	0.16	0.24	0.03	0.04	0.02	0.06	1.55
KCcm3	0.96	1.05	13.21	0.03	0.10	1.14	0.05	0.04	0.04	0.08	1.21
KCus4	1.98	0.09	14.52	0.05	0.09	0.37	0.08	0.10	0.56	0.24	1.52
KFek5	1.22	0.99	12.31	0.03	0.09	0.45	0.03	0.04	0.03	0.70	1.42
KGoa6	1.80	0.11	14.82	0.06	0.12	0.57	0.07	0.09	0.05	0.31	1.42
KMea7	1.90	1.69	12.52	0.05	0.13	0.56	0.03	0.05	0.04	0.09	1.30
KSct8	2.15	0.12	16.13	0.08	0.09	0.51	0.08	0.06	0.04	0.28	1.51
KSpa9	2.50	1.38	11.22	0.07	0.25	0.27	0.03	0.05	0.04	0.12	1.54

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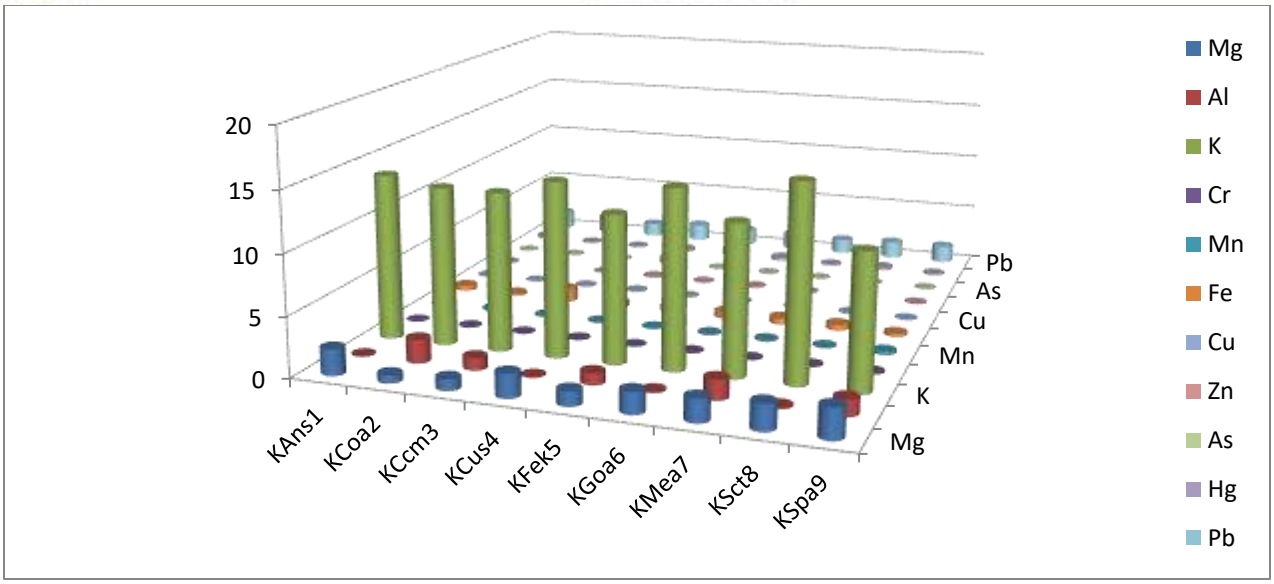

Bar graph of elemental variations in Kalaburagi samples

Table 4. Essential elemental content in Fresh Water Leafy Vegetables Ayurvedic Medicinal plants (in ppm) in Yadgir region

Code No.	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
YAns1	1.73	0.08	10.49	0.03	0.09	0.28	0.01	0.04	0.11	0.36	1.37
YCoa2	1.18	2.22	11.19	0.06	0.24	0.33	0.03	0.07	0.07	0.16	1.45
YCcm3	1.20	1.64	11.35	0.04	0.11	0.47	0.02	0.06	0.03	0.63	1.75
YCus4	1.83	0.07	12.32	0.06	0.10	0.38	0.03	0.05	0.12	0.45	1.27
YFek5	1.02	2.63	09.25	0.04	0.08	0.31	0.02	0.03	0.06	0.70	1.48
YGoa6	1.63	0.09	13.26	0.08	0.07	0.32	0.04	0.07	0.14	0.66	1.57
YMea7	1.33	2.36	10.22	0.05	0.12	0.47	0.03	0.04	0.05	0.74	1.53
YSct8	1.72	0.06	13.43	0.07	0.08	0.29	0.02	0.03	0.13	0.45	1.17
YSpa9	2.04	3.22	10.90	0.02	0.16	0.36	0.02	0.03	0.09	0.45	1.67

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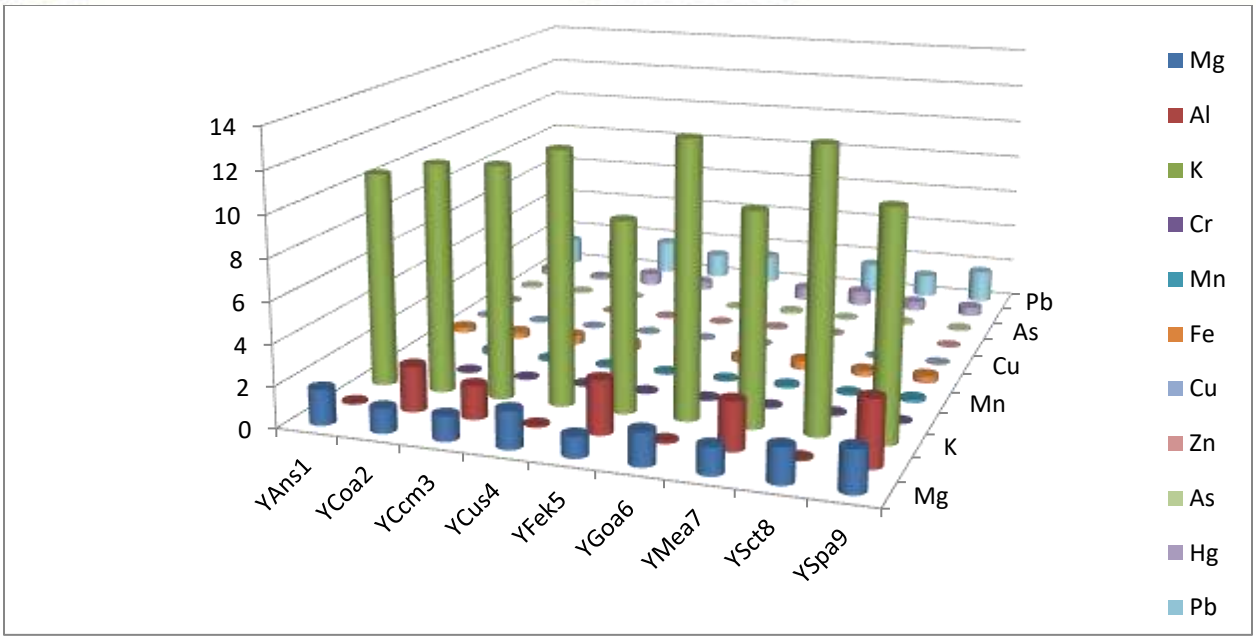

Bar graph of elemental variations in Yadgir samples

Table 5. Essential elemental content in Drainage Water Leafy Vegetable Ayurvedic Medicinal plants (in ppm) from Bidar district

Code No.	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
BAns1	0.98	1.00	38.62	0.03	0.39	2.82	0.17	0.41	0.52	0.86	0.13
BCoa2	1.23	0.42	32.75	0.02	1.01	2.21	0.16	0.27	0.51	1.02	0.15
BCcm3	0.87	1.02	13.07	0.02	0.24	4.97	0.13	0.26	0.12	0.78	0.01
BCus4	1.25	0.52	22.66	0.01	0.23	2.46	0.23	0.39	0.98	0.68	0.20
BFek5	0.75	1.57	25.24	0.01	0.43	7.90	0.21	0.41	0.19	0.95	0.10
BGoa6	0.68	0.92	21.12	0.01	0.17	4.48	0.18	0.60	0.59	0.43	0.03
BMea7	0.75	3.44	29.97	0.01	0.80	10.33	0.22	0.36	0.22	1.05	0.02
BSct8	0.86	1.20	25.57	0.01	0.30	4.98	0.15	0.33	0.14	0.03	0.01
BSpa9	0.94	2.47	22.10	0.01	1.37	8.97	0.21	0.38	0.22	0.23	0.07

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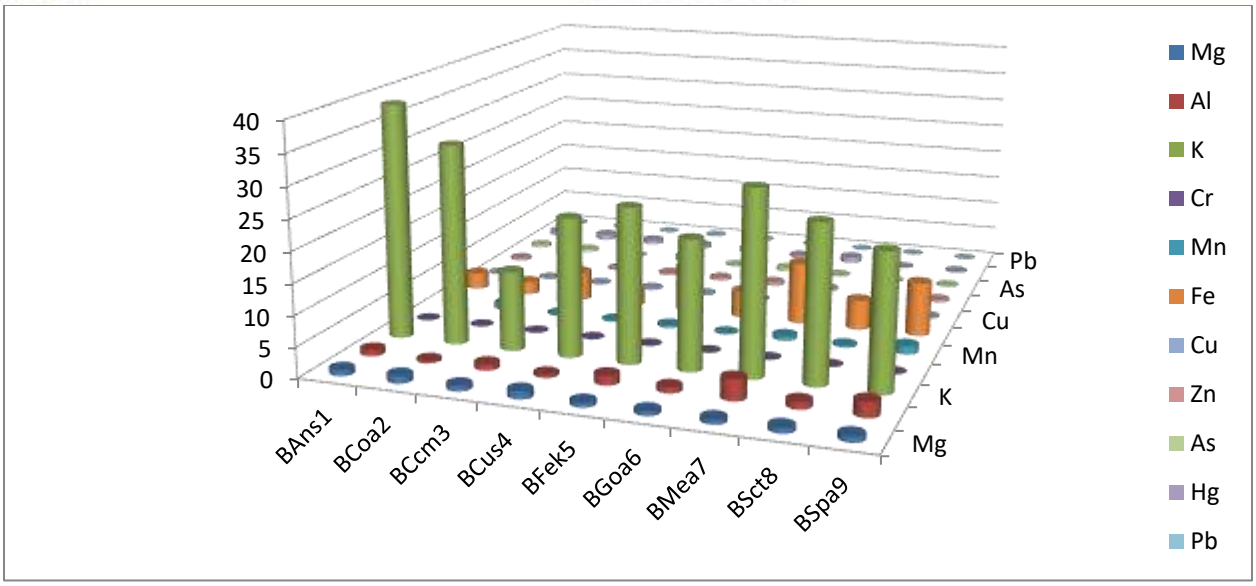

Bar graph of elemental variations in Bidar samples

Table 6. Essential elemental content in Drainage Water Leafy Vegetables Ayurvedic Medicinal plants (in ppm) from Kalaburagi district

Code No.	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
KAns1	2.53	2.74	10.89	0.07	1.11	4.82	0.38	0.54	0.24	0.09	0.12
KCoa2	1.56	1.08	13.92	0.02	0.57	2.00	0.18	0.28	0.13	0.12	0.15
KCcm3	0.98	13.30	33.95	0.01	0.61	5.49	0.30	0.36	0.15	0.25	0.11
KCus4	1.43	1.06	26.04	0.03	0.16	1.85	0.16	0.39	0.34	0.34	0.16
KFek5	1.52	1.23	24.71	0.03	0.28	2.66	0.24	0.29	0.52	0.16	0.14
KGoa6	0.87	1.92	30.02	0.02	2.24	8.32	0.22	0.33	0.47	0.19	0.17
KMea7	0.78	0.23	29.88	0.04	0.24	3.42	0.21	0.30	0.35	0.45	0.02
KSct8	1.63	0.36	27.24	0.05	0.10	6.79	0.15	0.19	0.56	0.20	0.02
KSpa9	2.42	0.43	29.89	0.01	0.71	5.11	0.21	0.27	0.45	0.71	0.04

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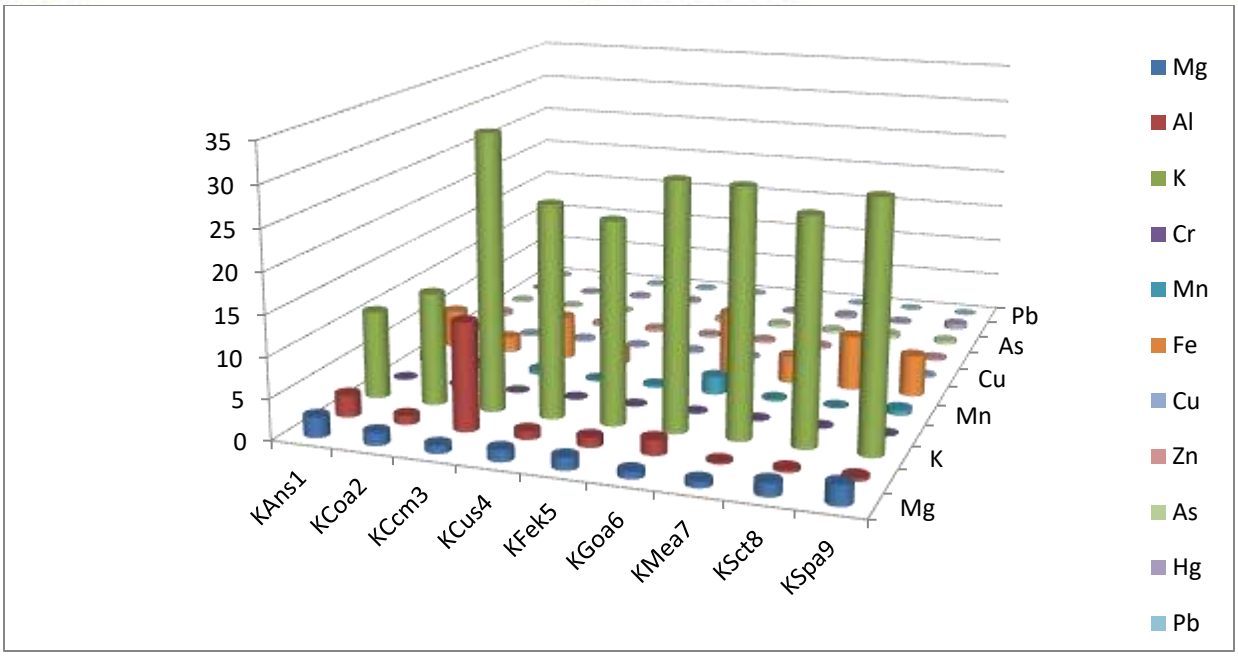

Bar graph of elemental variations in Kalaburagi samples

Table 7. Essential elemental content in Drainage Water Leafy Vegetable Ayurvedic Medicinal plants (in ppm) from Yadgir district

Code No.	Mg	Al	K	Cr	Mn	Fe	Cu	Zn	As	Hg	Pb
YAns1	1.42	1.01	24.44	0.01	0.15	3.18	0.19	0.23	0.98	0.25	0.15
YCoa2	2.13	1.40	33.16	0.06	0.55	1.25	0.21	0.28	0.16	0.17	0.17
YCcm3	0.75	0.92	30.84	0.01	0.41	3.00	0.17	0.43	0.28	0.52	0.23
YCus4	0.85	1.94	27.03	0.05	0.07	0.55	0.22	0.24	0.63	0.09	0.01
YFek5	0.67	1.12	23.99	0.02	0.21	2.02	0.14	0.36	0.72	0.23	0.15
YGoa6	1.23	1.48	26.42	0.06	1.03	1.36	0.14	0.18	0.67	0.10	0.12
YMea7	1.43	0.77	27.19	0.04	0.31	2.46	0.15	0.21	0.14	0.13	0.04
YSct8	1.62	1.77	26.29	0.06	0.19	0.96	0.17	0.32	0.62	0.12	0.08
YSpa9	0.95	1.17	27.32	0.06	0.40	1.44	0.15	0.30	0.25	0.18	0.11

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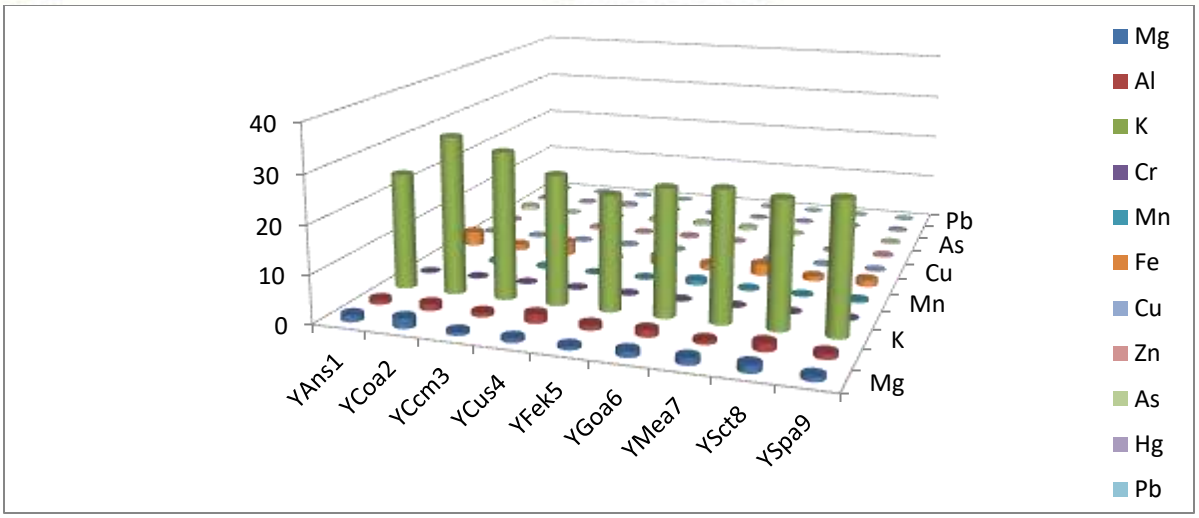
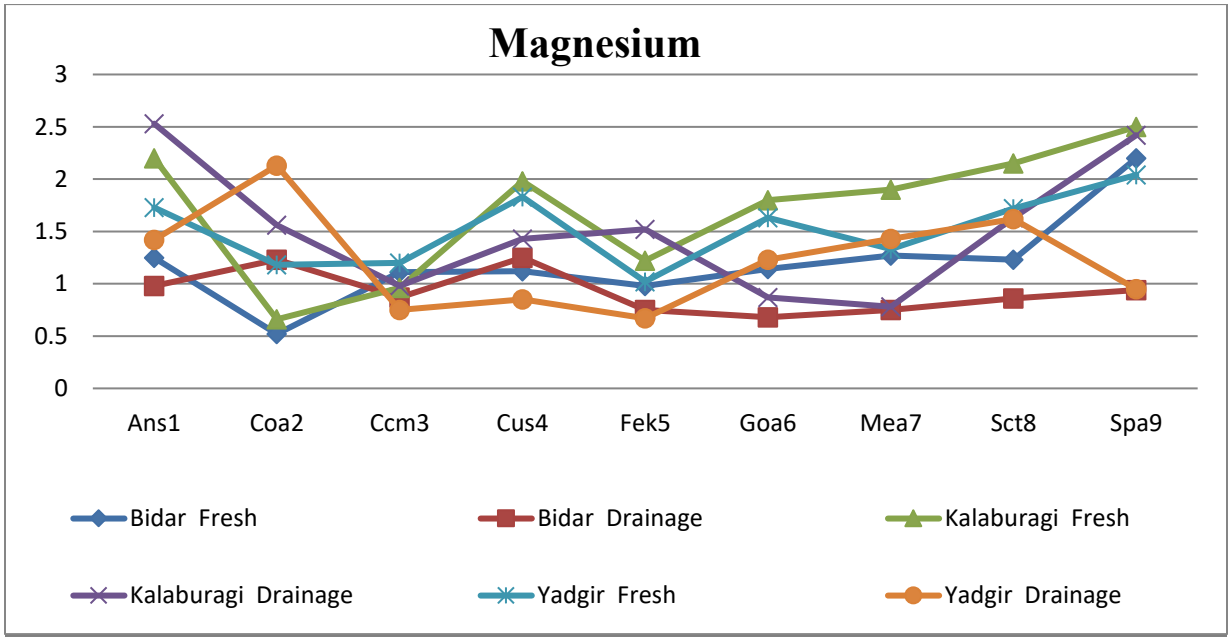


Bar graph of elemental variations in Yadgir samples

The above tables and graphs show the trend of major, trace and toxic elemental concentrations which were examined by a Flame Atomic Absorption Spectrometer.

I. Major Elemental concentrations in fresh and drainage water medicinal plants

Magnesium (Mg):



Mg content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir regions

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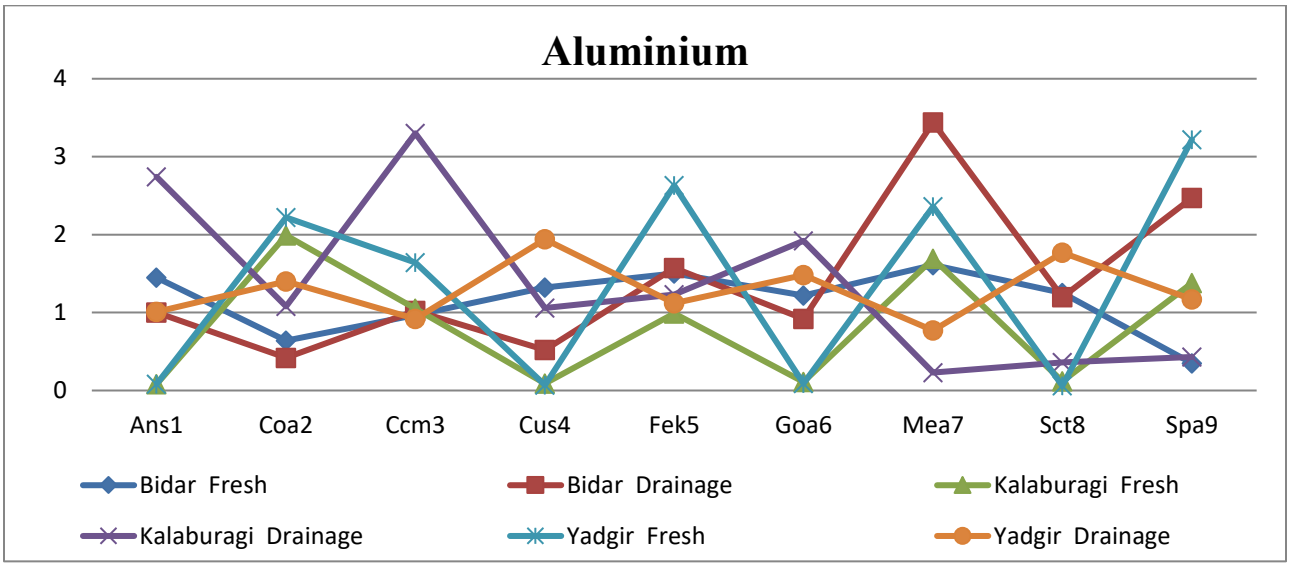
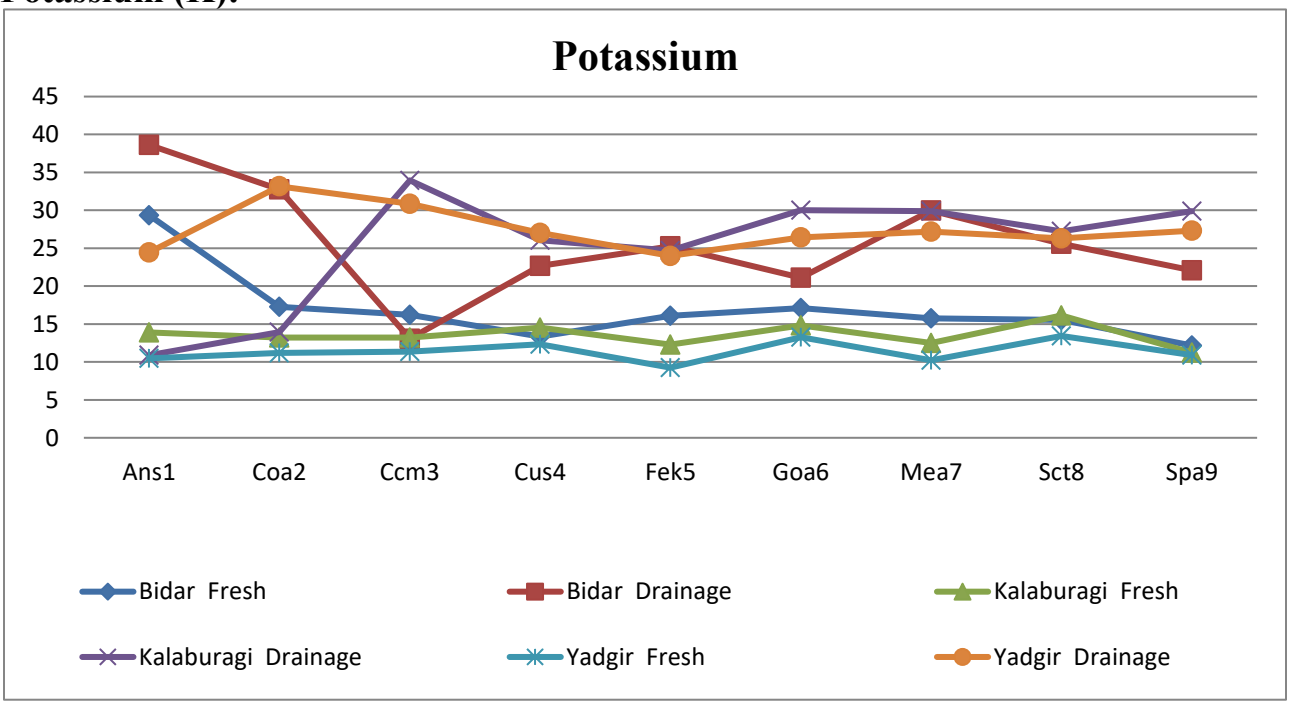
Aluminium



Al content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir regions

Potassium (K):



K content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir regions

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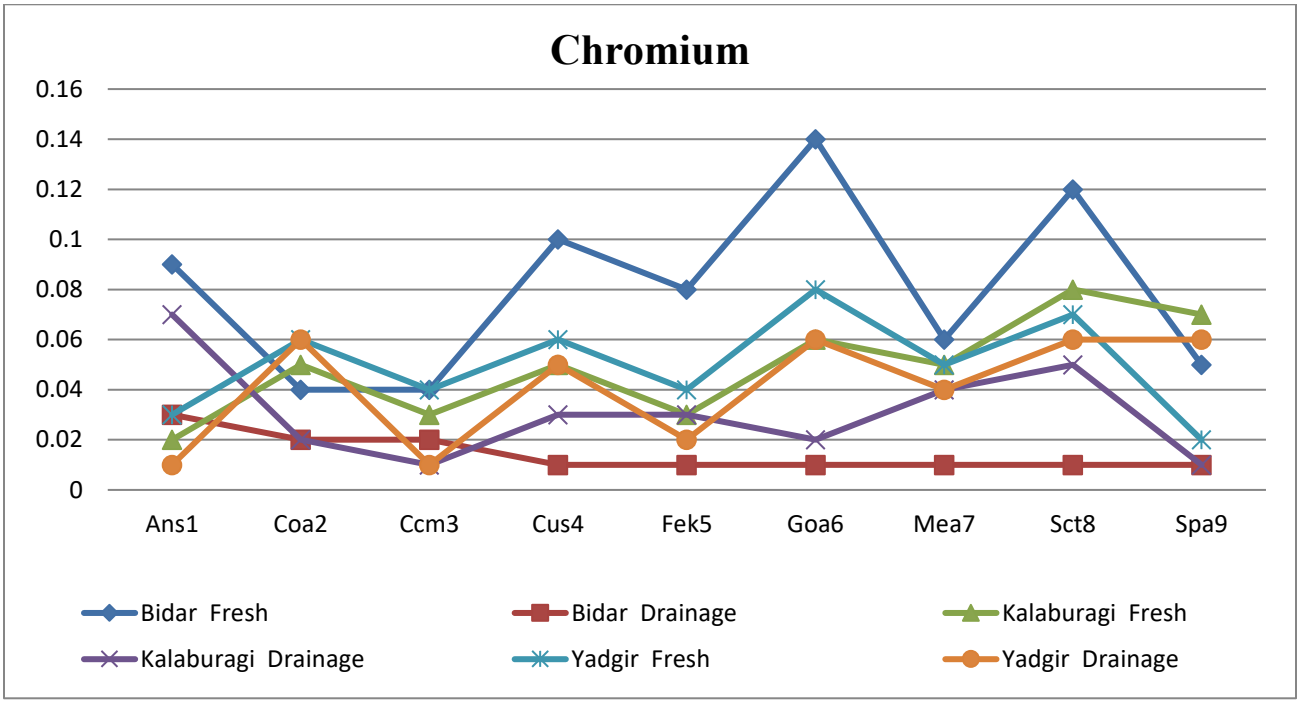
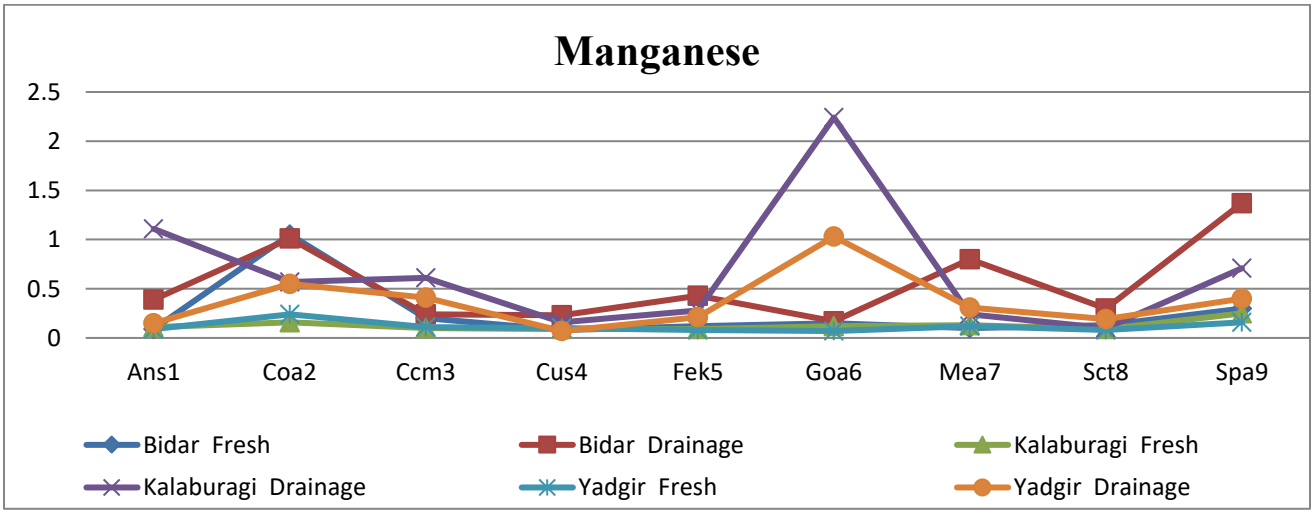
II. Micro or trace elements in fresh and drainage water medicinal plants

Chromium (Cr):



Cr content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir regions

Manganese (Mn):



Mn content in fresh and drainage water samples of Bidar,Kalaburagi and Yadgir regions

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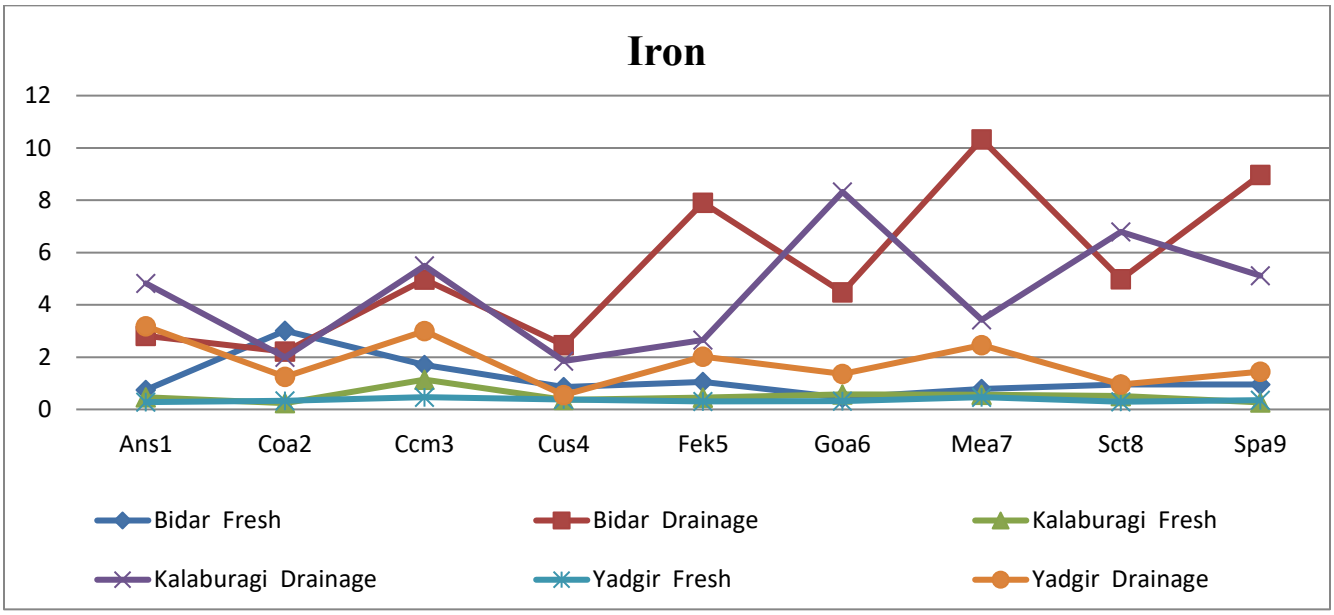
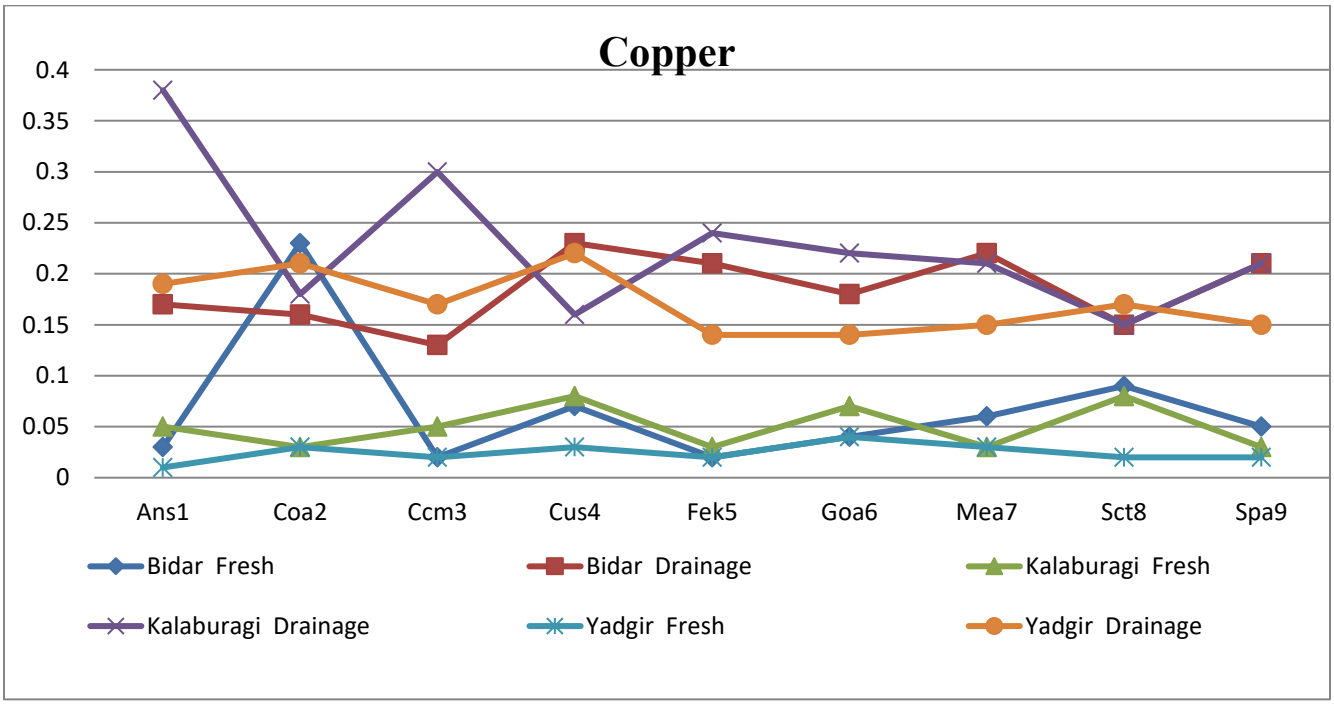
Iron (Fe):



Fe content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir regions

Copper (Cu):



Cu content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir region

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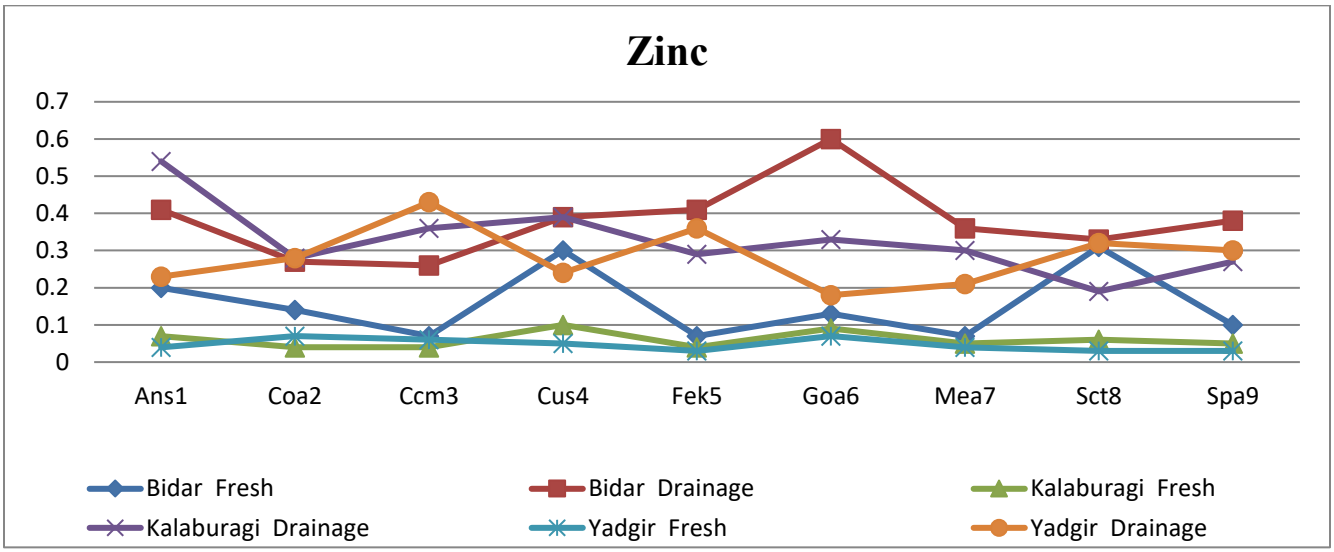
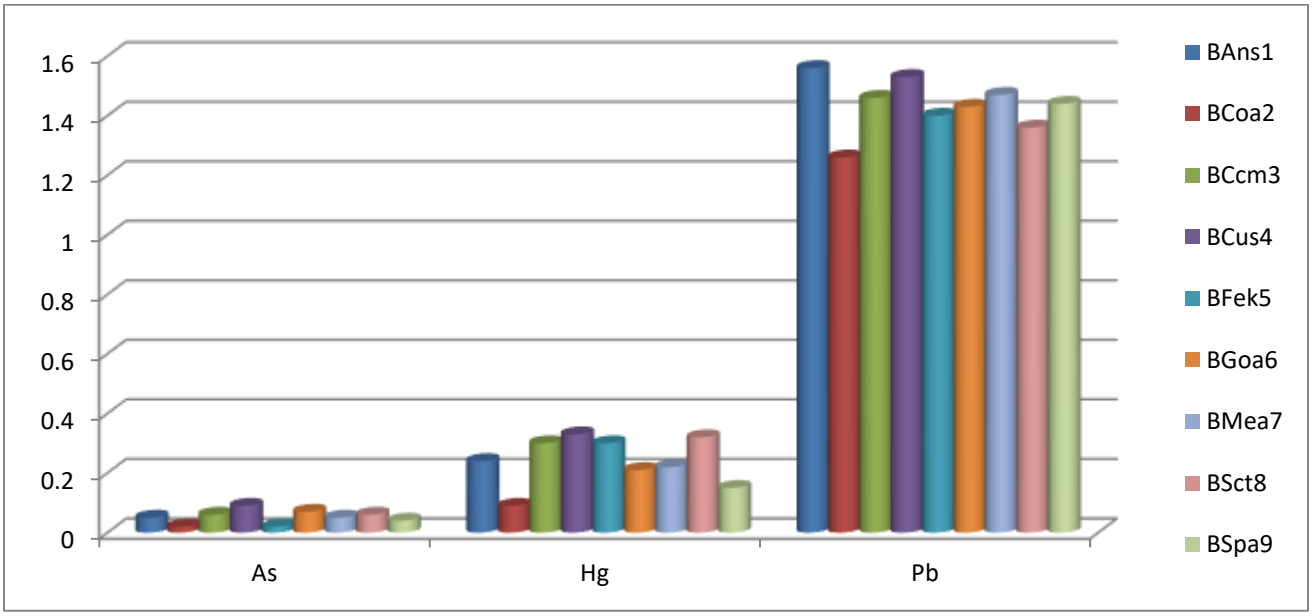
Zinc (Zn):



Zn content in fresh and drainage water samples of Bidar, Kalaburagi and Yadgir regions

III. Toxic elements in fresh water medicinal plants

Bidar



As, Hg and Pb content in fresh water samples of Bidar region

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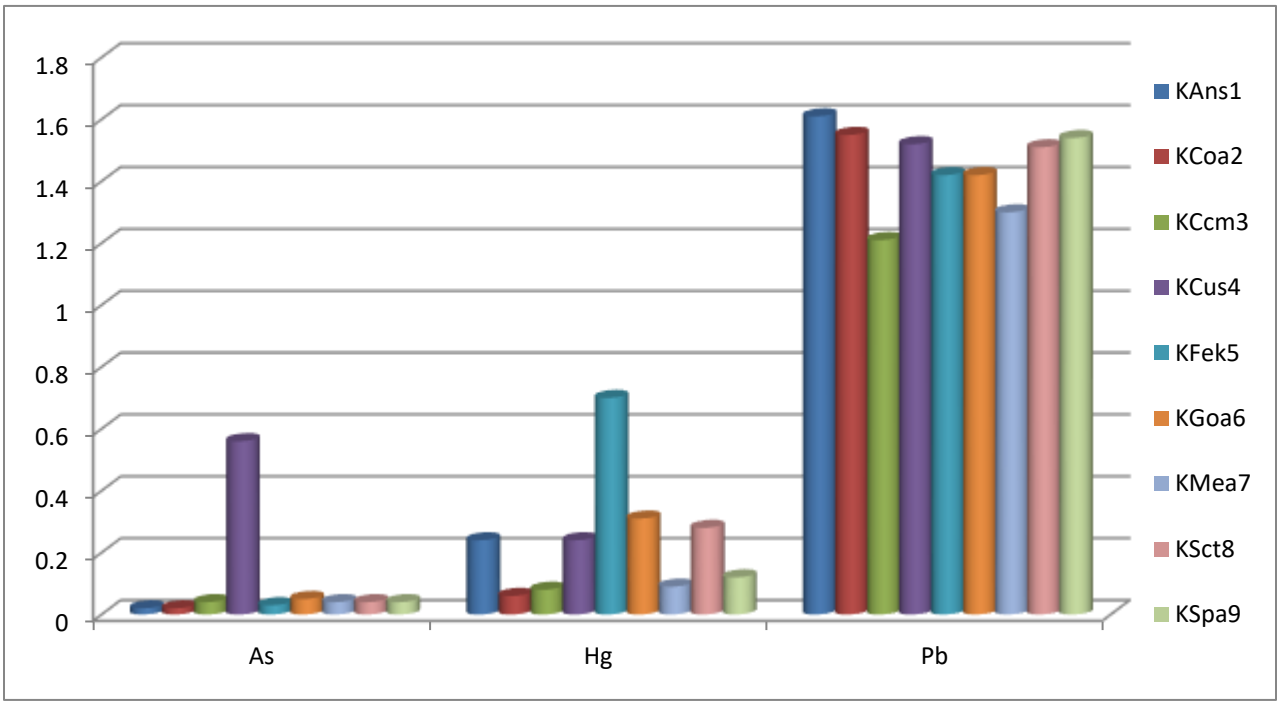
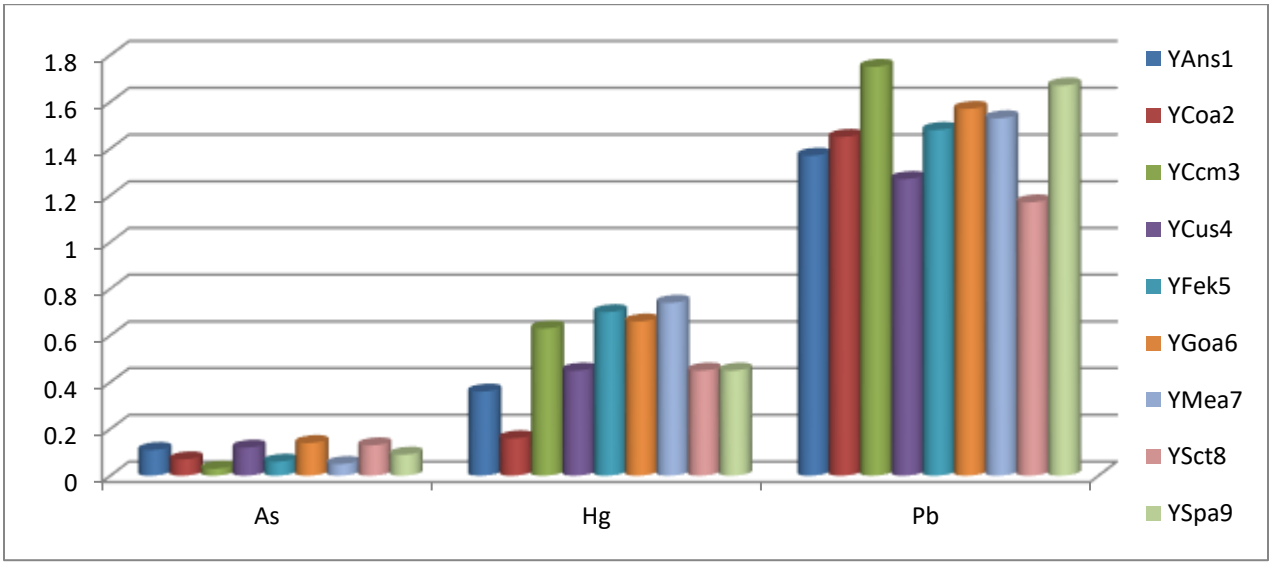
Kalaburagi



As, Hg and Pb content in fresh water samples of Kalaburagi region

Yadgir



As, Hg and Pb content in fresh water samples of Yadgir region

RESULTS AND DISCUSSION

The present work is carried out successfully on different Ayurvedic medicinal plants of Bidar, Kalaburagi and Yadgir districts of Kalyan-Karnataka *region*. All detected elements are classified as major element Magnesium (Mg), micro or trace elements viz. Manganese (Mn), Iron (Fe), Copper (Cu) and Zinc (Zn) elements, toxic elements Arsenic (As) and Lead (Pb) respectively. 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 leaf samples contain essential mineral elements and nutrients at an acceptable level; further it helps to study the phytochemical analysis. Similarly, the present studied medicinal plants contain high metabolic activity and biological process of human and medicinal plants.

CONCLUSION

Total 09 different Ayurvedic medicinal plants collected and examined by using high efficient fluorescence methods such as FAAS instrument.The present investigation provides information on the elemental concentrations, maximum abundance of Potassium (K) content is varied orderly manner in Bidar> Kalaburagi> Yadgir medicinal plants and second maximum abundance of Magnesium (Mg) content is varied in Kalaburagi > Bidar > Yadgir medicinal plants. The third abundance of Iron (Fe) is varied as Bidar> Kalaburagi> Yadgir medicinal plants. The remaining Cr, Cu, Zn, As, Hg and Pb elemental content varied under permissible limits of WHO in all nine leafy Ayurvedic vegetable medicinal plants. The present study revealed the variations of elemental content from plant to plant.

Moreover, the present analysis represents that all detected elements are shown within the permissible limits of WHO/FAO and some other standard permissible limits of medicinal plants. Present studied data is useful to the new researchers, medicinal practitioners to prepare new health drugs and promote the society. Elements with vitamins A, C, D and E improves the secondary metabolites of the medicinal plants and the human body, also helps to study the phytochemical compounds, which have some antimicrobial properties. The present analysis reveals that the surface morphology with grain size associated element will play an important role in mediating the diseases at the earliest. Accumulation of toxic elements will exceed the daily intake level and causes kidney damage, liver damage, skin cancer, neurotoxicity etc, of the human body. Symptoms

are dryness of the mouth, difficulty in swallowing, nerve pain, vomiting, nausea, stomach pain and diarrhea.

This information may be helpful in the synthesis of new Ayurveda medicine drugs which can be used for the control of various diseases, also makes the body physiologically stronger against multi-drug resistance human pathogen. The profile of elements mainly depends on the geographical reproduction of water, soil and Physiological changes of environment.

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