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A STUDY ON MAJOR AND TRACE ELEMENTS IN *Lantana camara Linn.* USING ATOMIC ABSORPTION SPECTROSCOPIC TECHNIQUE

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ABSTRACT:
Lantana Camara Linn. is an important medicinal plant widely used in traditional medicinal systems. This study describes the effect of regional variation on the major and trace elements content of leaves, roots, and stem of *Lantana camara Linn.* using the atomic absorption spectroscopic technique. The elemental analysis was carried out for different parts of (viz. Leaves, roots, and stem) *Lantana camara Linn.* collected from three different areas of the Konkan region. A total of eight elements Cu, Zn, Cr, Cd, Pb, Fe, Mn, and Ni were measured in the collected sample. From the study, it was found that the concentration of Pb, Cd, Cr, and Mn was high in the contaminated region sample while the other elements such as Cu, Zn, and Ni were moderate.

Keywords:
Lantana camara, medicinal plant, trace elements, AAS technique.

INTRODUCTION

The traditional medicinal plants plays an important role in the traditional medicine system. The survey conducted by World Health Organization (WHO) reported that about 80% of the world's population consumes traditional medicinal plats in direct and indirect ways to treat diseases. *Lantana Camera Linn.* is a perennial, scan-dent shrub belonging to the family Verbenaceae. It is a flowering ornamental plant. *Lantana camara Linn.* Is also known as Lantana, Common Lantana, Red sage, Yellow sage, Surinam Tea plant[1], Spanish flag[1],and shrub verbena. *L. camara* is distributed all over India in tropical and sub tropical regions, where there is a moderate to high summer and rainfall. *L. camara* is known by different names in various languages in India viz., Raimuniya (Hindi), Chaturangi and Vanacehdi (Sanskrit), Ghaneri and Tantani (Marathi), Arippu and Vnnichedi (Tamil), Aripoov, Poochedi, Konginipoo and Nattachedi (Malayalam), Trirei, Samballei and Nongballei (Manipuri), Pulikampa (Telegu), Kakke and Natahu (Kanada).[2,3]
L. Camera is an important medicinal plant with several medicinal properties and it is used in traditional medicinal system as well as in recent scientific studies. It is use to cure cold, cough, flu, yellow fever, jaundice , d.ysentery, malaria, toothaches, ulcers, swellings, and sprains, in the recent studies it is reported

that *L. camara* possess anticancer and antiproliferative activity, antibacterial activity, analgesic activity[4], hemolytic activity, anti-fungal, anti-mutagenic, antioxidant, anti-hyperglycemic, anti-inflammatory, anti-mobility, antiurolithatic, anti fertility, anti filarialand mosquito controling activity[1].

Various major and trace elements occur in plant in a minute amount. The amount of each element present in plant depends on the environmental conditions also. The amount of each element has to be maintained within its required limit. Before the invention of spectrophotometric technique the researcher were unable to measure the precise concentration of the trace elements[5]. This study describes the effect of regional variation on the major and trace elements content of leaves, roots and stem of *L. camara* using atomic absorption spectroscopic technique.

MATERIALS AND METHODS

A) Sample Collection

The samples were collected from three different regions of Konkan viz., Sindhudurga, Chiplun and Raigrah. About 500-100 g of each part of plant (viz., leaves, roots and stem) were collected and then collected plant materials were washed in distilled water to eliminate contamination due to dust. The washed plant materials were dried in shade for two days avoiding direct contact of sunlight. Then the plant materials were kept in oven for 2-3 days at 25^0C(+\- 5^0C) for drying. The dried material then ground to a fine powder which was further used for the elemental analysis.

B) Sample Preparation for Elemental Analysis

A 5 g of powdered sample was taken in a silica crucible and then heated it on Bunsen burner for about 30 minutes till fumes evolved. After that the crucible was kept in a muffle furnace for 2 hrs at 450^0C (=/- 10^0C) to get Grey ash. The obtained ash was used for preparation of solution. The ash was dissolved in 40 ml aqua regia and kept it on a hot plate to get concentrate of 20 ml. Filtered the solution through Whatman filter paper No. 41. A distilled water was added to the filtered solution to made it 100 ml solution. The same procedure was repeated for all the samples. The obtained solutions were finally used for the measurements of trace elemental analysis using AAS technique.

C) Determination of Elements

The elements Cu, Zn, Cr, Cd, Pb, Fe, Mn and Ni in leaves, stem and roots of *L. Camara* plant samples collected from different regions were analyzed using AAS. The elemental analysis was performed with a Shimadzu Atomic Absorption Spectrophotometer with model No. AA-7000. it is equipped with dedicated flame and furnace or combined flame or furnace option. Air-C_2H_2 flame was used for determination of trace elements and Wizard software was used for recording the data. The **Table.1** shows the operating parameters of the working elements. The supporting gas (air) flow was 15.0 L/min for all the elements during analysis. The absorption wavelength for the determination of each element with its linear working range and correlation coefficient were calibrated for the analysis **Table 2**.

Table 1
Operating parameter for working elements

Elements	Wavelength (nm)	Slit width (nm)	Lamp Current (mA)	Flame Type	Fuel Flow (L/min)	Burner Height (mm)
Cu	324.8	0.7	8	Air-C_2H_2	1.8	7.0
Zn	213.9	0.7	8	Air-C_2H_2	2.0	7.0
Cr	357.9	0.7	10	Air-C_2H_2	2.8	9.0
Cd	228.8	0.7	8	Air-C_2H_2	1.8	7.0
Pb	283.3	0.7	10	Air-C_2H_2	2.0	7.0
Fe	248.3	0.2	12	Air-C_2H_2	2.2	9.0
Mn	279.5	0.2	10	Air-C_2H_2	2.0	7.0
Ni	232.0	0.2	12	Air-C_2H_2	1.6	7.0

Table 2
Correlation coefficient of element under study

Element	Correlation coefficient (r)
Cu	0.998
Zn	0.995
Cr	0.992
Cd	0.999
Pb	0.999
Fe	0.999
Mn	0.997
Ni	0.996

RESULTS AND DISCUSSION

The normal range of concentration of eight major and trace elements namely Cu, Zn, Cr, Cd, Pb, Fe, Mn and Ni in plants is presented in **Table 3.** [5]

Table 3
Typical concentrations of six metals in plants

Element	Normal range in plant materials (ppm)	Concentration in contaminated plant (ppm)
Cu	4-15	15-100
Zn	3-100	100-400
Cr	1-10	10-100
Cd	0.1-10	10-100
Pb	0.1-10	10-300
Fe	50-300	300-400
Mn	0.05-100	100-300
Ni	0.02-5	5-100

Table 4

Concentration of elements (in mg/L) in the different parts of L. camara collected from Konkan region

Region	Element	Concentration (ppm)		
		Leaves	Stem	Roots
Chiplun (Contaminated)	Cu	0.789	0.158	0.447
	Zn	1.913	0.883	0.425
	Cr	12.592	9.666	0.944
	Cd	4.342	2.868	4.908
	Pb	9.362	3.412	1.400
	Fe	2.358	3.592	4.331
	Mn	0.293	0.099	0.061
	Ni	2.329	4.847	7.091
Raigrah (Modearte/Normal)	Cu	0.496	0.021	0.114
	Zn	7.396	5.117	6.338
	Cr	1.037	2.592	0.311
	Cd	0.369	0.593	0.570
	Pb	1.225	1.750	0.700
	Fe	4.288	3.807	2.972
	Mn	0.868	0.367	0.651
	Ni	3.652	2.811	2.280
Sindhudurga	Cu	1.816	0.954	1.980

(Normal)	Zn	12.913	14.316	11.912
	Cr	0.040	0.062	0.093
	Cd	0.054	0.087	0.078
	Pb	0.075	0.400	0.362
	Fe	6.545	7.157	9.544
	Mn	0.311	0.913	0.830
	Ni	1.052	1.615	2.079

CONCLUSION

For exploring the potential effect of different areas on *L. camara,* this study was carried out. Among all the metals analyzed (viz. Cu, Zn, Cr, Cd, Pb, Fe, Ni) in *L. camara* concentration of Cr, Cd and Pb was found to be relatively higher side in contaminated region. Concentration of Cu, Zn, Fe, Mn, and Ni was found to be moderate in all the regions.

It may be said that the higher concentration of heavy metals in contaminated region, because of air pollution, water pollution and soil pollution.

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