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Research Article

DETECTION OF METALS PRESENT IN LEAVES OF *LAGERSTROEMIA SPECIOSA*

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ABSTRACT

Natural products have provided important therapeutic use in several areas of medicine. The Leaves of *Lagerstroemia speciosa* were reported to possess good Anti-Diabetic activity. This study deals with Detection of metals present in the *Lagerstroemia speciosa*, by using ICP-OES (Inductively coupled plasma atomic emission spectroscopy) and Flame photometry instrument. The essential metals like sodium, potassium, Iron, Magnesium and Zinc were found to be predominant, while the heavy metals like cadmium, mercury and lead were found to be below the detectable limit. It has been clinically proved that the essential metals eg. Magnesium and zinc were used in the treatment of type II diabetes. The present study supports the anti-diabetic activity of this species.

Keywords: *Lagerstroemia speciosa*, ICP-OES, Flame photometry

INTRODUCTION

Lagerstroemia speciosa (*Lythraceae*), called as banaba, is a native of Philippines. Leaves of it have been traditionally used over thousands of years as folklore treatment by the native Indians and more recently used by the Japanese, mostly as tea preparation. Banaba leaves has the ability to reduce blood sugar level and its "Insulin like principle" made it popular herbal decoction and with others in many formulations for controlling blood sugar and weight loss [1].

Lagerstroemia speciosa have been previously reported to have hypoglycemic activity by reducing fasting blood glucose of streptozotocin-induced diabetic rats. Apart from hypoglycemic activity [2-6] banaba leaf also possess antioxidant [7], anti-inflammatory [8], anti-obesity [9], anti-fibrotic [10], anti-bacterial [11] properties. Researchers have carefully studied the use of nutrientional supplements in the treatment of diabetes such as vitamins C and E, dietary minerals and herbs can safely lowers the blood sugar and help to prevent the diabetic complications [12-15]. From the literature review, the present work has been designed to detect the metals present in *Lagerstroemia speciosa*.

MATERIAL AND METHODS

Plant material collection and authentication

The leaves of *Lagerstroemia speciosa* were collected from the medicinal garden of VIT University, Vellore, Tamil Nadu, India, in the month of May-July 2011. It was authenticated by the botanist, Dr. P. Jayaraman, Department of Botany, PARC, Tambaram, Tamil Nadu.

Sample preparation

The matured leaves of the *Lagerstroemia speciosa* were identified, collected, dried and crushed into powder by a mixer. This powder was taken for further analysis.

Nitric acid digestion method

One gram of the powder was placed in a 250 ml digestion tube and 10 ml of concentrated nitric acid was added. The sample was heated for 45 min. at 90 ˚C, and then the temperature was increased to 150˚C at which the sample was boiled for at least 8 hrs until a clear solution was obtained. Concentrated nitric acid was added to the sample (5ml was added in three regular intervals of times) and digestion process was continued until the volume was reduced to about 1 ml. The interior walls of the tube were washed down with a little amount of deionised water and the tube was swirled throughout the digestion to keep the wall clean and prevent the loss of the samples. After cooling to room temperature, 5 mL of 1% nitric acid was added to the sample. The solution was filtered with Whattman No.42 filter paper. It was then quantitatively made up to 25 mL with deionised water in a volumetric flask. This filtrate was used for the detection of metals by Flame photometry and ICP OES Metal Analyzer.

Flame photometry

Sample preparation for flame photometry

Nitric acid digestion method was followed to prepare the clear solution of the sample. From the stock solution, prepare 0.2 ppm, 0.4 ppm and 0.6 ppm. Trace amount of Na and K can be determined by flame photometry at a wavelength 589 nm and 766.5 nm respectively. The estimation of sodium and potassium was based on the emission spectroscopy which deals with the excitation of electrons from ground state to higher state and come back to its original state by emission of light. The sample was sprayed into gas flame and excitation was carried at under carefully controlled and reproducible conditions. The desired spectra were isolated by the use of interference filters. The intensity of light at 589 nm was approximately proportional to the concentration of elements. After careful calibration of photometer with solution of known composition it was possible to correlate the intensity of a spectral line of unknown solution with the amount of an element present that emits the particular radiation. Results were tabulated in Table No. 1

Table 1: Absorbance of sodium and potassium metals

Concentration of Sample (ppm)	Sodium absorbance at 589 nm (ppm)	potassium absorbance at 766.5 nm (ppm)
0.2	0.13	1.27
0.4	0.24	2.22
0.6	0.47	3.09

ICP OES

Sample preparation for ICP OES

ICP-OES instrument can analyze concentration of metal ions of solid and liquid samples. However these samples are to be fed into the instrument only as a clear solution. Nitric acid digestion method is used to prepare clear solution of sample. The concentration of sample in the final provided solution is 2% v/v. Zinc, Magnesium, Iron, *etc.,* are the metals to be analyzed using ICP-OES. When plasma energy is given to an analysis sample from outside, the component elements (atoms) was excited. When the excited atoms return to low energy position, emission rays (spectrum rays) are released and the emission rays that correspond to the photon wavelength are measured. The element type is determined based on the position of the photon rays, and the content of each element is determined based on the rays' intensity. Results are tabulated in Table no. 2 and graphically represented in Fig. 1.

Table 2: Concentration of metals in the plant leaves

Metals	Concentration (mg/1 L)
Cadmium	BDL
Chromium	0.425
Iron	2.422
Mercury	BDL
Magnesium	32.64
Zinc	0.837
Lead	BDL

BDL: Below detectable limit.

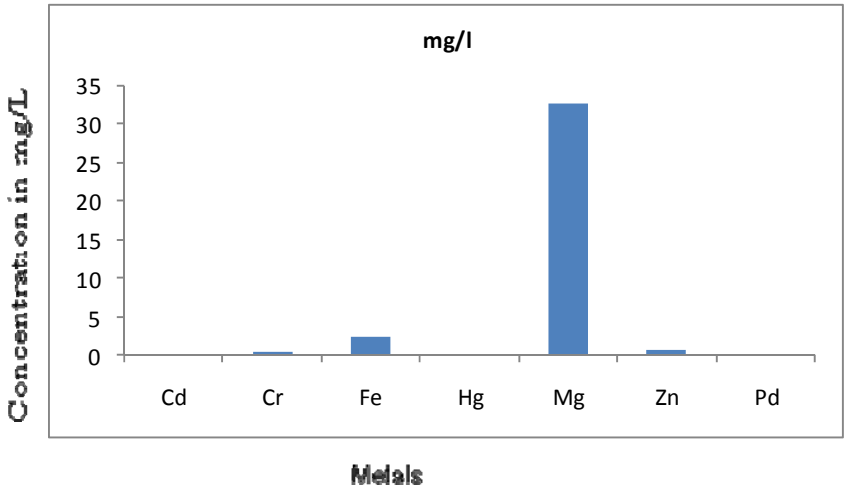

Fig. 1: Graphical representation

RESULTS

Natural occurrence of macro and micro nutrient is highly important for the life cycle of the plants. The sodium and potassium were quantitatively detected from the leaves of *Lagerstromia speciosa* by Flame photometry. ICP OES results confirms the presence of essential metals like Iron, Magnesium, and Zinc, while heavy metals like Cadmium, Chromium, Mercury and lead were found to be below the detectable limit.

CONCLUSION

From this study it confirms that plant *Lagerstroemia speciosa* having the essential metals like Magnesium, Zinc and Iron, which supports for the treatment of Diabetes, also this information provides the key role for the preparation of the formulation, which would serve a better role in diabetic patients.

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