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Estimation of Moisture Content & Metal Ions in White Flowers of *Bougainvillea spectabilis* and Purple Flowers of *Bougainvillea glabra* in Pakistan

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ABSTRACT

Bougainvillea consists of 18 shrubby species, growing in different parts of Pakistan and is being used as Anti-ulcer, Anti-diarrheal, Anti-microbial, Anti- diabetic, Amylase Inhibition and as for low blood pressure but none of the studies on Bougainvillea focused on the estimation of metal ion concentration. The focus of the present study was to estimation of moisture content and comparative analysis of trace metal ions in white flowers of *Bougainvillea spectabilis* Willd and Purple flowers of *Bougainvillea glabra* Choisy. The metal ions concentration either essential or non essential, critically affect the biological system of the human body. Here are many factors including the different types of pollution-fertilizer, insecticides, pesticides and other forms of air and water pollution etc.- that effect directly on metal ion concentration in *Bougainvillea* and indirectly in biological system if used traditionally as medicine.

Keywords: Bougainvillea white and purple flowers, Metal ions, Environmental effects, Health effects

1. INTRODUCTION

Nyctaginaceae is a family of 30 genera and about 290 species found in tropical and subtropical parts of both hemispheres, and especially America. This family is represented in Pakistan by five genera, one of which, *Bougainvillea*, consists of 18 shrubby species. *Bougainvillea* is a climbing shrub with spines and showy flowers, the color of which ranges from white, purple [Fig-1] yellow, orange, various shades of red & purple and violet[1].Biological and chemical reported data describes that *Bougainvillea* show evidence of variety of properties like, color and bioactivity [1]Anti-ulcer / Anti-diarrheal / Anti-microbia activity as leaves studied for anti diarrheal, anti-ulcer, and anti-microbial activities[2], Insulin-like effect of pinitol ,D-pinitol (3-O-methyl-chiroinositol) [Fig-2]an active principle of the traditional antidiabetic plant .*Bougainvillea spectabilis (*B. *spectabilis)*, is claimed to exert insulin-like effects. This study investigates the effect of D-pinitol on glucose homeostasis in animal models of diabetes, and on glucose transport by cultured muscle cells[3], Antimicbacterial, Antidiabetic, Amylase Inhibition such as study of the chloroform extract of *Bougainvillea spectabilis* showed significant alpha-amylase inhibitory property[4], Anti-fertility, Antihyperlipidemic / D-pinitol, radical scavenging activity found in the aqueous extracts of B. *spectabilis* produced more free radical scavenging than Bauhinia *divaricata*. Results were superior to common synthetic antioxidants used in the food industry and presents a potential for applications in pharmaceutical or alimentary preparations[5]. The alcoholic extract of leaves of *Bougainvillea* are more active against Gram positive and Gram negative bacteria[6]. An antiviral protein active against mechanical transmission of tomato spotted wilt virus was identified in the root tissues of *Bougainvillea spectabilis* Willd[7].Overall *Bougainvillea* is being used for a variety of disorders, for diarrhea, and to reduce stomach acidity elsewhere, for cough, sore throat, for blood vessels for hepatitis, a decoction In Panama, an infusion of the flowers of *Bougainvillea glabra* also used as treatment for low blood pressure.

A B

Fig-1: (A) White *Bougainvillea spectabilis* Willd (B) Purple *Bougainvillea glabra* Choisy
Origin: (Botanical garden of University of Karachi)

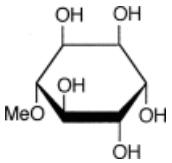

Fig-2: Structure of D-pinitol (1 D-3-O-methyl-chiroinositol).

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The ignorant people from other parts of the world and also those from Pakistan who are illiterate habitually use herbal extract for the cure of certain traditional diseases and exposed to large amount of toxic elements., such as Iron overload is a condition in which iron deposited in liver, kidney and spleen of human beings & instead of its importance iron could be toxic. When in excess, it damages the tissues[8].The aim of our study was to estimate the concentration of Ca, Na, K, Mg, Zn, Mn, Cu and Fe in white and purple flowers of *Bougainvillea* growing in Pakistan.

2. EXPERIMENTAL

Samples of *Bougainvillea* were collected in morning time and transported to the laboratory in polythene bags. The flower petals were dried in oven and grinded to powder form by using electrical grinder. All chemicals and standards used were of analytical grade. Metal ions analysis was carried out by Analyst 700 Atomic Absorption Spectrometer – (PerkinElmer).Moisture content determined by using lab grade oven.

2.1 *Determination of moisture content*

The fresh sample of flower , leaf and stem was selected for estimation of water content measurement .Initially weighed accurately 1 gm of each then dried to a constant mass in an oven at a temperature of 100°C.Final weight was recorded and % moisture calculated on the basis of fresh and dry masses in gm by using formula

$$\%\text{MOISTURE} = \frac{\text{Initial weight (gm) - Final weight (gm)}}{\text{Initial weight (gm)}} \times 100$$

2.2 *Estimation of metal ions in white and purple colored flowers*

One gm stored powdered sample of each white and purple colored flower , soaked separately in 25 ml of 1 N HCl for 24 hr, then filtered through filter paper Whatman no 42.Final volume was made up to 50 ml in volumetric flask by using ultra pure water .Ca, Na, K, Mg, , Zn, Mn, Cu & Fe were analyzed by the use of AAnalyst 700 Atomic Absorption Spectrometer – (PerkinElmer) .Absorbance values recorded at different wavelength precise for each metal ion. The calibration curves were constructed using a series of dilutions containing different levels of metal ions.

3. RESULTS AND DISCUSSION

It was observed, water content in purple flowers of *Bougainvillea glabra* choisy 79.46 %, in leaf 75.64% and in stem 69.17%. It was 81.68% in white flowers of *Bougainvillea spectabilis*, 72.35 % in leaf and 66.2 % in stem. In both white and purple colored flowers of *Bougainvillea* moisture % is in increasing order as stem < leaf < flower [Table 1,2 & Fig-3].Calibration curved were used for the determination of accurate values of metal ions in ppm. [Table-3] showed that In both purple and white flowers concentration of metal ions is in decreasing order as follows K > Mg > Fe > Na > Ca > Mn > Zn > Cu. Concentration of potassium is highest in both flowers (56.79 ppm) ,as K is highly mobile and can aid in balancing the anion charges within the plant. It also has high solubility in water and leaches out of soils that rocky or sandy that can result in potassium deficiency. Comparatively level of Potassium ions in both flowers are equivalent but Mg, Fe, Ca, Mn, and Zn is greater in purple flowers. Plants deficient in magnesium show stress responses. The first observable signs of both magnesium starvation and over exposure in plants is a decrease in the rate of photosynthesis. This is due to the central position of the Mg^{++} ion in the chlorophyll molecule means in plants, magnesium is necessary for synthesis of chlorophyll and photosynthesis. Iron is essential to nearly all known organisms such as for photosynthesis and is also present as an enzyme cofactor in plants. Calcium regulates transport of other nutrients into the plant and is also involved in the activation of certain plant enzymes. Calcium is one of the most important elements in the diet because it is a structural component of bones, teeth, and soft tissues and is essential in many of the body's metabolic processes. Manganese is necessary for building the chloroplasts. Manganese deficiency may result in coloration abnormalities, such as discolored spots on the foliage. Manganese is an essential trace nutrient in all forms of life. The classes of enzymes that have manganese cofactors are very broad and include oxidoreductases,transferases, hydrolases, lyases, isomerases, ligases,lectins, and integrins. Zinc is required in a large number of enzymes and plays an essential role in DNA transcription. Level of sodium is slightly greater in white (8.985 ppm) > purple (8.850 ppm) flowers. It can also substitute for potassium in some circumstances.

Table-1: Moisture content in flower , leaf and stem –*Bougainvillea glabra* Choisy, Purple

Bougainvillea Purple	Initial weight (gm)	Final weight (gm)	Difference (Initial-Final) (gm)	% Moisture
Flower	1.000 +/-0.001	0.2054	0.7946	79.46 +/-0.001
Leaf	1.000 +/-0.001	0.2436	0.7564	75.64+/-0.001
Stem	1.000 +/-0.001	0.3083	0.6917	69.17+/-0.001

Table-2: Moisture content in flower , leaf and stem –*Bougainvillea spectabilis* Willd, White

Bougainvillea White	Initial weight (gm)	Final weight (gm)	Difference (Initial-Final) (gm)	% Moisture
Flower	1.000 +/-0.001	0.1832	0.8168	81.68+/-0.001
Leaf	1.000 +/-0.001	0.2765	0.7235	72.35+/-0.001
Stem	1.000 +/-0.001	0.3379	0.6620	66.20+/-0.001

The ratio sodium/potassium concentrations in intercellular and extracellular fluids is responsible for the transport ions through the cellular membranes, the regulation of the osmotic pressure inside the cell, the transmission of nervous pulses and other electrophysiological functions. Concentration of copper is also less in purple (0.135) < white (0.160), Copper is required for the normal functioning of plants, animals, humans, and most microorganisms. It is incorporated into a variety of proteins which perform specific metabolic functions**.** The level of copper is least in both flowers and it is also needed in relatively small amounts which can be stored in the body, and daily presence in the diet is therefore not necessary.

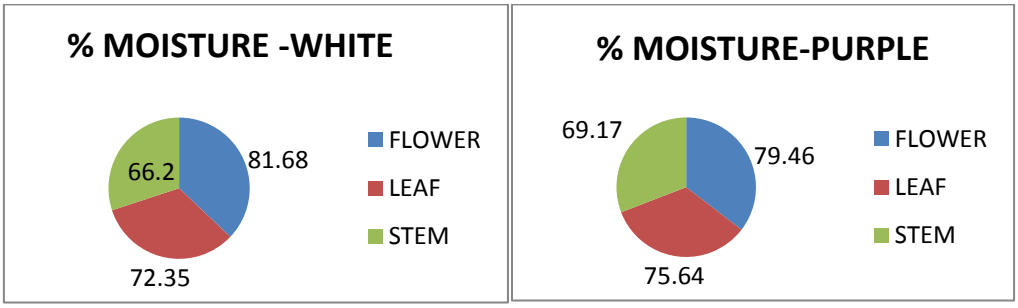

Fig-3: % moisture in flower, leaf & stem

Table-3: Concentration of metal ions in white & purple flowers

Wavelength (nm)	**422.7**	**589.0**	**766.5**	**285.2**	**213.9**	**279.5**	**324.8**	**248.3**
Analyte in Purple flower (ppm)	**Ca**	**Na**	**K**	**Mg**	**Zn**	**Mn**	**Cu**	**Fe**
Replicate No 1	5.719	8.888	56.79	30.88	0.334	0.585	0.134	26.98
Replicate No 2	5.699	8.835	56.79	29.86	0.336	0.584	0.133	26.56
Replicate No 3	5.779	8.828	56.79	29.07	0.326	0.589	0.136	26.82
Mean concentration (ppm)	5.732	8.850	56.79	29.94	0.332	0.586	0.135	26.78
SD	0.0417	0.0328	0.001	0.908	0.0054	0.0029	0.0015	0.214
% RSD	0.73	0.37	0.00	3.03	1.63	0.50	1.15	0.80
Analyte in White flower(ppm)	**Ca**	**Na**	**K**	**Mg**	**Zn**	**Mn**	**Cu**	**Fe**
Replicate No 1	2.468	8.916	56.79	24.65	0.251	0.469	0.161	10.37
Replicate No 2	2.463	8.990	56.79	25.75	0.245	0.474	0.160	10.52
Replicate No 3	2.485	8.970	56.79	24.75	0.248	0.473	0.160	10.39
Mean of concentration (ppm)	2.472	8.958	56.79	25.05	0.248	0.472	0.160	10.43
SD	0.0118	0.0385	0.002	0.606	0.0033	0.0028	0.0004	0.084
% RSD	0.48	0.43	0.00	2.42	1.34	0.59	0.27	0.81

SD = standard deviation, %RSD = percent relative standard deviation

4. CONCLUSION

The present investigation showed that the concentrations of different metals ions Mg, Fe, Ca, Mn, and Zn in white and purple flowers are not exactly same and further can be altered badly by the change in environmental conditions. Thus, in the light of our studies, the conclusion may be drawn that metal ions either deficient or in overload condition can causes severe effect in biological system as responsible for various chemical and biochemical imbalance.

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6. REFERENCES

1. Ali, M. S., Natural Product Research, **(2005)** 19: 1 – 5, http://dx.doi.org/10.1080/14786410310001630609.
2. Edwin, E., Sheeja, E., Toppo, E., Tiwari, V., Dutt, K. R., Ars Pharm, **(2007)** 48 (2): 135-144.
3. Bates, S. H., Jones, R. B., Bailey, C. J., Br J Pharmacol. **(2000)** 130 (8): 1944-1948,
4. Bhat, M., Zinjarde, S. S., Bhargava, S. Y., Kumar, A. R., Joshi, B. N., Evid Based Complement Alternat Med., **(2008)**.
5. Chaires-Martinez, L., et al, A Pharmacognosy Research **(2009)** 1(5) 238- 244.
6. Umamaheswari, A., Shreevidya, R., and Aparna, N., Advances in Biological Research **(2008)** 2 (1-2): 01-05.
7. Balasaraswathi, R., Sadasivam, S., Ward, M., Walker, J. M., Phytochemistry, **(1998)** 47(8):1561-5.
8. Rehmani, F. S., J. Saudi Chem. Soc., **(2005)** 9(2): 265-270.
9. Rehmani. F. S., Journal of Chemical Society of Pakistan, **(2005)**, 27(3): 263-267.
10. Rehmani, F. S., Journal of Chemical Society of Pakistan, **(2006)**, 26(6): 552-556.
11. Rehmani, F. S., Journal of Chemical Society of Pakistan, **(2010)**, 32(4): 467-470.
12. Azmat, R., Haider, S., Riazi, M., Pak. J. Bot., **(2009)** 41(5): 2289-2295.
13. Azmat, R., Khan, N., Pak. J. Bot. **(2011)** 43(1): 515-520.
14. Saikia, H., Lama, A., International Journal of Pharmaceutical Sciences and Drug Research, **(2011)**, 3(2): 141-145.