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Research Article

DETERMINATION OF TRACE ELEMENTS IN *ALOE VERA* L. (*ALOE BARBANDENSIS* MILLER) FROM DIFFERENT LOCATIONS IN GWALIOR, MADHYA PRADESH AND ITS IMPORTANCE

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ABSTRACT

Flora and fauna need minerals in small quantity for theirgrowth and development.Main objective of the present study is to explore the presence of micro and macromaterialsin the leaves of Aloe veraz. Liliaceae, which were obtainedfrom various sites of Gwalior, Madhya Pradesh.As per the methodology is concerned, the accumulation of heavy metals like Fe, Cr, Cu, Ni, Zn, Mn, Cd, Co and Pb in Aloe vera leaves collected show range of various heavy metals in Aloe vera leaves of all samples were Fe (19.11 to 26.23), Cr (6.72 to 4.86), Cu (3.27 to 2.11), Ni (6.91 to 5.02), Zn (50.21 to 46.13), Cd (1.60 to 0.71), Co (3.78 to 2.31) and Pb (17.11 to 14.21). Result showed the concentration of Sodium, Calcium, Iron, Magnesium, Zinc, Copper, Lead and Cadmium were detected quite high in almost all the samples. *Aloe vera* is also a source of herbaldrug preparation. It is a good alternative for treatment of untreated water and contaminated landas it can absorb traceelements from the land. Minerals are required in little quantity for the growth and development of living organisms. Excess concentration of trace elements in soil increase the rate of uptake by plant roots that affects the metabolism of plants as well as animals. In the conclusion it can be mentioned that, *Aloe vera* L. (*Aloe barbadensis* Miller) plant absorbs good amount of metals from the soil during its growth and it is one of the important plants that is used as herbal drug and direct application as a remedy of various diseases. In small quantity heavy metals are playing important role in the living system but heavy metals may be hazardous if level goes above the maximum permissible concentrations. The aim of the present study is to assess the Results revealed that concentration of trace metals in *Aloe Vera* leaves are quite high and could be harmful if consumed directly.

INTRODUCTION

North Africaandthe Mediterranean region of southern Europe are best places for*Aloe vera*[1]. It iscommonin Asian countries, southern part of Europe, Mexico and Latin America. *Aloe vera*acts as a physiological carrier for many active biological agents[2]. Current researches showedthat arthritis, chronic pelvic pain, high cholesterol, hypertension, immune system disorder and diabetes can be treated with *Aloe vera*[3]. It is also an antibacterial andantifungal agent. Minerals maintainspecificphysico-chemical processes, constituents of enzymes and structural components of tissues in various metabolic pathways[4].

Research Methodology

Sample Collection

Three sites have been marked for the collection of fully developed, healthy and fresh *Aloe vera* leaves.These sites are - Site I (Jaderua Dam), Site II (Gwalior Shivpuri Link Road) and Site III(Rairu) in and around Gwalior city. These leaves were cleaned with fresh water[5].

Sample Preparation

Removal of thick epidermis was done after cutting those leaves into pieces.After this dry ashingmethodology is applied[6]. This method is generally practiced by holding the leaves inside an open vessel and damaging the combustible part of the leaves by thermal decomposition using a muffle furnace. 450-550^{0}C temperature is required for a typical dry ash technique[7].$Mg(NO_3)_2$ is generally used as an ashing aid. Scorching the sample before muffling is generally preferred. Charring is accomplished using an open flame. This technique will damage all theorganic matterof the sample[8]. The ash was removed from crucible and allowed to dry indesiccator. The quantity was approximatelyfour gram perhundred gram[9].

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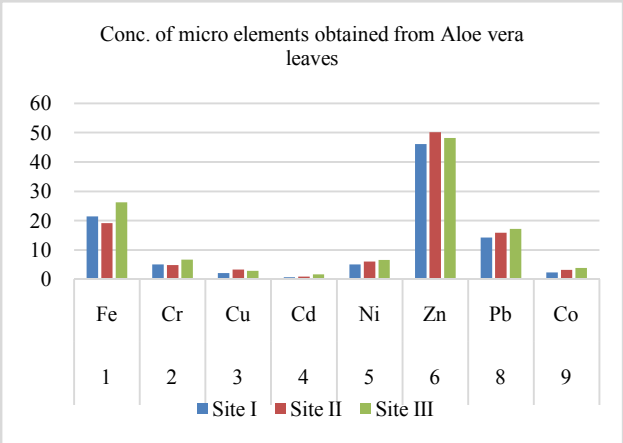
Trace Elements Assessment

Dry ash was taken at the quantity of 1 gm and digested using conc. HNO_3, H_2SO_4 and $HCLO_3$ in the ratio of 10:6:3and thoroughly dried at a temperature of around 235 - 245°C[10]. This digested sample was made up to the volume of 50 ml in a volumetric flask and utilized forassay of trace materials through AASby proper hollowcathode lamps of Perkin Elmer AAnalyst 100. For each sample fivereplicates were prepared[11].

Table 1 mean±seconcentration (ppm) levels of heavy metals in *aloe vera*leaves

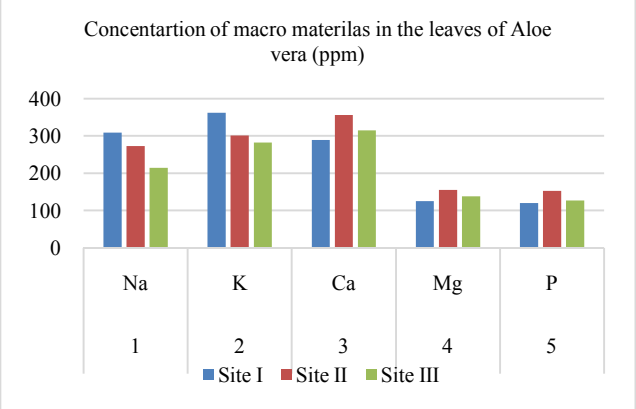
S. No.	Element	Site I	Site II	Site III
1	Fe	21.37±1.81	19.11±1.52	26.23±2.87
2	Cr	5.01±0.14	4.86±0.28	6.72±0.67
3	Cu	2.11±0.11	3.27±0.90	2.89±0.49
4	Cd	0.71±0.02	0.92±0.10	1.6±0.27
5	Ni	5.02±0.02	6.04±0.12	6.56±0.71
6	Zn	46.13±1.32	50.21±1.54	48.21±2.11
8	Pb	14.21±1.01	15.85±1.29	17.11±1.34
9	Co	2.31±0.09	3.14±0.56	3.78±0.40



Graph I Conc. of micro elements obtained from *Aloe vera* leaves

Table 2 Mean±SEConcentration (ppm) levels of heavy metals in *Aloe vera*leaves

S. No.	Element	Site I	Site II	Site III
1	Ca	289±6	356±16	315±9
	Na	309±11	273±10	215±7
2	K	362±10	301±18	282±11
3	P	120±10	153±13	127±9
4	Mg	125±8	155±12	138±6
5	Cu	2.34±0.6	1.81±0.8	1.32±0.3
6	Fe	19.23±1.8	16±1	11±2
7	Pb	12±2	24±3	10±1
8	Cd	1.2±0.1	1.93±0.4	1.67±0.6
9	Zn	198±6	236±11	219±10



Graph II Conc. of macro elements obtained from the leaves of *Aloe vera*

RESULT AND DISCUSSION

The results show that Fe, Cr, Cu, Cd, Ni, Zn, Pb and Cowerefound in greater concentration in the samples collected from 3 sites (Table 1). Comparative variations have been identifiedin all componentsof all the study site samples[12]. Every element has a significant role in the overall integrity of the living cells and organisms. Studies on animals and human confirmed that optimal intake of trace materials like sodium, chromium, zinc, calcium, magnesium and coppercanminimize individual risk factors[13]. The function of inorganic materials like Cr, Fe, zinc, manganese, copper alsoenhanced the impaired glucose forbearance and their role of controllingdiabetes[14].

- Magnesium helps in bone formation, absorption of calcium which in turn maintain bone health and prevent osteoporosis. It helps in controlling diabetes, heart health, migraine headaches, premenstrual syndrome and relieving anxiety[15].
- Copper helps in arthritis, regulates production of melanin, works as brain stimulant. It plays a major part in the haemoglobin synthesis. Has significant antidiabetic activity[16].
- Zinc helps in regulating immune function, treating diarrhoea, brain memory, common cold, wound healing and decrease chances of age-related chronic disease.
- Ironhelps in boosting haemoglobin formation, increases function of the brain, regulates body temperature, controlling anaemia[17].

From the graphical representations it can be concluded that Site II, i.e. Jaderua dam region has highest concentration of micro and macro elements in Gwalior.

CONCLUSION

Trace elements present in *Aloe vera* plant, namely, Zn, Mn, Cu, Fe, Mo, Cu, Bwereidentified as significant and Silicon, Cobalt, Sodiumand Strontium as for the plant. Micro minerals are used in comparatively lesser quantity and generate<0.1% of dry plant tissue. Few trace elements might be harmful if and when consumed at a relatively higher quantity. Soil is the main source of microelements for *Aloe vera* plant, except in situations of large catastrophic disaster or from water calamity by contaminated waters which is not possible in the study area.

The information generated from the present research work also shown that *Aloe vera* is a good absorber of variousmetals and as a result it can also be used for the segregation of heavy metal from the land and untreated water.

There aremany elements in *Aloe vera* plant out of which 16 are most significant for the nourishment of the plant. Fe, Cu, Zn, Bo, Mo, Mn, Cl are the micro elements which are required in lower quantity for agricultural and reproductive development of crop plants. Calcium is one of the most valuable components of plant cell wall and it has a significant role in early growth and development of roots.

Aloe vera is an important medicinal plant constituting several trace elements including micro and macro minerals which have significant role on human and animals.

References

1. MS Shelton. *International Journal of dermatology*. 1991, 30, 679-683
2. CK Lee; SS Han; YK Shin; MH Chung; YI Park; SK Lee; YS Kim. *Int. J. Immunopharmaco*.1999, 21(5): 303-310.
3. AK Lozak; K Solty; P Ostapczuk. *Science of Total Enviornment*, 2002, 289, 33-40.
4. M Ozcan. *Food Chemistry*, 2003, 84, 437-440.
5. L Coulston; P. Dandona. *Dibetes*, 1980, 29, 665-667.
6. NS Rajurkar; MM Damame. *Appl. Radiat. Isot.,* 1998, 49, 773-776.
7. Reynolds, G. W. 1974. The aloes of South Africa, ed. 3. (Aloe SA)
8. Wyk, B.-E. 2009. Medicinal plants of South Africa. (Med Pl SA)
9. Nriogo J O (1979). *Nature* 279: 409-411
10. Shehu A., Mullaj A, Harizaj F, Shehu J (2010). Assessment of Heavy Metals
11. Lozak, A., K. Soltyk. And P. Ostapczuk. 2002. *Sci. Total Enviorn*, 289:33-40.
12. Baker AJM, Brooks RR (1989). *Biorecovery*1: 81-126.
13. Langille WM, MacLean KS (1976). *Plant Soil* 45: 17-26.
14. Hanna W J, Grant CL (1962). *Bull Torrey Bot Club* 89: 293-302.
15. Ernst WHO, Verkleji JAC, Schat H (1992). *Acta Bot Neerl*41: 229-248.
16. Memon AR, Ito S, Yatazawa M (1979). *Soil Sci Plant Nutr*25: 611-620.
17. Memon AR, Ito S, Yatazawa M (1980 b). *Soil Sci Plant Nutr*26: 271-280.

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