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Determination of The Mineral Elements of Aerial Parts of *Pulicaria* Plant and The Growing Place Soil.

Alirez Sardashti*, and Samane.Khaleghi.

Department of Chemistry, Faculty of science, University of Sistan and Baluchestan, P.O.Box 98135-167, Zahedan, Iran.

ABSTRACT

Pulicaria undulate is a permanent plant with height of 20-50 cm and has a Thick and bushy form. It is a self- growing plant which grows near water- streams, we plains and holes. This plant has therapeutic properties. Native peopte use it as boiled or evaporated Form, for curing simple diarrhea. Unfortunately because of environmental pollutions, toxic compounds along with heavy metals are absorbed by plant.Afterpreparing aerial organs of the plant; we heated them at 400 C^0 in the oven. Until they converted into ashe.There for, by pill-making, we can measure the oxides of metals and elements of scarce metals, by means of XRF technique. The results of which are as follow in leaf sample CaO(6.75%), Na_2O(0.80%), MgO(1.56%),K_2O (2.77%).In another study, with wet method utilizing HNO_3 and $HClO_4$; some solutions (pH=1) were prepared for measurement by Flame atomic absorption technique, the results of which are as follow: in leaf sample Mn (164.23±0.08 dry mg/kg), Fe (288.34±0.06drymg/kg) ,Cu(8.48 %), Co(3.33%), Zn (74.59%) in stem sample Mn(192.80±0.08)dry mg/kg) ,Fe(346.94±0.06 dry mg/kg) comparison of result indicates that, the elements which are useful for plant growth in leaf sample are more than that of stem. Using two different techniques mostly was because that we could not deter mine the amounts of metal oxides and scarce element only by means of the Flame atomic absorption technique, so, we used both techniques of above-mentioned and XRF which are accurate and complementary.

Keywords: *Pulicaria undulate,* mineral elements Determination, growing place soil, XRF technique

Corresponding author

INTRODUCTION

The genus *Pulicaria,* belonging to the family Compositae is represented by ca. 80 species from which five species occur in Europe. *Pulicaria undulata* (common fleabane) is a perennial plant, growing up in damp places in the South, West and central Europe it has been used against diarrhea, dysentery and as insecticide. The genusis characterized by the presence of flavonoids, acetylenes, sesquiterpene lactones, Unfortunately because of environmental contaminations including some of heavy metals the plant has been contaminated so with respect to the importance and medicinal utilizations of them the reduction of contamination is necessary [1,2,3].The soil of habitat is not salty mostly about 6mm/cm alkaline neutral acid to basic with a ph from 7.4 to 8.8.it' s poor regarding organic materials it is an effective species in said conservation that despite of being resistant to dryness it is seriously damaged in continual droughts it is very appetizing. Because of having little fragrant substances comparing with other kinds of Artemisia it is considered for live stock pasturing in the spring and summer [4].In 2015 Sardashti et al. sprayed humic substances onto root soil around the base of plant, and measured metal ions in plant organs before growth and after HS spray during growth, the results indicated reduction in the amount of metal ions and better growth of plant [5].Element analysis of aerial organs of *Pulicaria* plant by techniques of Flame atomic absorption and XRF technique.

MATERIALS AND METHODS

Sampling

Aerial parts of *Pulicaria undulate* were collected from Tamandan village, around the skirt of Taftan mountain of Sistan and Baluchestan province at early month of first month of summer season after separation from the plant the leaves were placed in the shadow, exposed to current of air, so that their moisture was removed. Then the dried leaves were grinded by molinx grinder, so they converted to powder.

Method of work

Approach two 5g samples of leaf powder was weight. The First sample with wet-method in the environment of Nitric acid and Chlodroric acid (1:2 ratios) was put under temperature of 400 ^{0}C for four hours. After refining, the product was placed into Juju balloon of 50 mL and then arrived to the volume by water-double distillation.pH of solution was one the containing mineral elements, excepting Arsenic (VGA-AAS) were measured by apparatus of Flame atomic absorption, second sample was placed in the Oven at 400 ^{0}C for 4 hours, then they obtained ashes was weighed as 0.58 g .mineral elements and oxides, existed in the obtained ashes were measured as tablet by XRF apparatus [6].

Reagent and material

For dilution, dematerialized water provided by a Millie-Q Plus filter apparatus (Millipore, USA) was used. All chemical were of analytical reagent grade (Merck, Germany). Element test solutions and calibration standards were prepared from commercially available (Titrisol, Merck, Germany) $^{ml}/_{g}$ stock solution using adjustable micropipettes (Gilson, France). Standards were acidified to 1% with nitric acid.

Equipment

Flame atomic absorption apparatus model PU 9100X, made in England by Philips company, VGA 77 made in Australia by Varian Company ,XRF apparatus Model D&Advance made in Germany by Broker company

Statistical analysis

Measurement of mineral elements were done in triplicates to test the reproducibility of them.All results are presented as mean ±S.E.Statistical analyses were performed by Student's t-test.The values of $P<0.05$ wereconsidered statistically significant.

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RESULTS AND DISCUSION

The effect of high correlation and close relation between plant covering and soil is as such that change in the situation of one of them has intensive influence on other performance of echo system. There for analysis of the growing place soil of plant has great importance along with analysis of aerial parts of plant in order to define mineral substances. In the present research, the growing place soil of *Pulicaria* plant was analyzed after initial preparation by XRF technique. Results show that these soils are little alkali and are relatively poor with respect to organic materials [7,8].The growing place soil of *Pulicaria* has higher acidity Aerial parts of the plant of was heated at 400 °C in furnace until they converted into ashes. Obtained ashes were analyzed according to the XRF techniques and Flame Atomic Absorption techniques. The amounts obtained by F.A.A.S for leaves of the *Pulicaria* were Zn^{+2} 59.74mg/kg; Ni^{+2}10.51mg/kg; Mn $^{+2}$164.23mg/Kg: Co^{+2} 3.33mg/kg;Cu^{+2} 8.48 mg/kg; Ag^{+} 0.78mg/kg of dry mass and for stem of the *Pulicaria* were Zn^{+2} 26.60mg/kg; Ni^{+2}.2.98 mg/kg ;, Mn^{+2} 192.80mg/Kg: Co^{+2} 1.01mg/kg;Cu^{+2}6.50mg/kg; Ag^{+} 0.57mg/kg: of dry mass(Table 1) .The second of Sample were heated at 400 0C in Furnace until they converted into ashes. The ashes was analyzed after initial preparation by XRF The amounts obtained by XRF technique for leaves were: MgO 1.56%:K_2O 2.77%; CaO 6.75%; Na_2O 0.80w/w of dry mass(Table 2). the results Leaves and stem of the plant analysis were consistent with the results of soil analysis. The amounts of Calcium, Manganese, Iron, Potassium and Sodium were high and the quantity of Copper, Zinc and Nickel was desirable. Meaning full difference was observed in different processes in the results, such as more increases in Calcium of leaves than Calcium quantity of the growing place soil that in turn, recognizes the higher ages of plant.

Table 1: Identification of the amounts of mineral elements in the *pulicaria* plant leaf and growing place soil by Flame atomic absorption

Metal ion	The amount of metal ion in leaves of plant (dry mg/kg)	The amount of metal ion in stem of plant (dry mg/kg)	The amount of metal ion in growing place soil (dry mg/kg)	The amount of metal ion in blank soil (dry mg/kg)
Ag	0.78 ±0.02	0.57±0.02	0.23±0.02	0.55±0.02
Cd	1.06±0.01	2.40±0.01	0.40±0.01	0.30±0.10
Co	3.33±0.03	1.01±0.03	2.70±0.03	0.60±0.03
Cr	1.20±0.02	2.11±0.02	1.30±0.02	1.40±0.02
Cu	8.48±0.03	6.5±0.03	1.10±0.03	0.65±0.03
Mn	164.23±0.08	192.80±0.08	223.85±0.08	125.30±0.08
Ni	10.51±0.03	2.95±0.03	7.75±0.03	2.90±0.03
Pb	4.86 ±0.01	3.75±0.01	6.35±0.01	6.15±0.01
Fe	288.34±0.06	346.94±0.06	289.60±0.06	143.70±0.06
Zn	59.74±0.04	26.60±0.04	29.50±0.04	33.15±0.04

Table2.Identification of the amounts of mineral elements in aerial parts of plant and growing place soil by technique of XRF

	metallic oxide	Weight percent of metal oxide and metal ion in leaves of the plant	Weight percent of metal oxide and metal ion in steam of the plant	Weight percent of metal oxide in of growing plac soil	Weight percent of metal oxide in blank soil
	SiO_2	33.81	33.81	50.81	52.35
	Al_2O_3	6.71	6.3 1	12.43	12.29
	TiO_2	0.23>	0.23>	0.76	0.81
	K_2O	2.77	0.25	1.80	2.24
	Na2O	0.80	0.98	0.78	0.84
	MgO	1.56	1.91	1.77	0.93
	CaO	6.75	5.70	5.83	5.69
	Fe_2O_3	3.73	1.89	6.23	5.65

The medicinal plants and the soil of their habitat were analyzed with dry and XRFtechnique. According in table 3 the amounts of these metals in different samples are as Follow:For the sample of plant leaf :Y(19.10mg/Kg),Nb(16.10mg/Kg),Sm(5.80mg/Kg),
for the sample of plant stem :Y(19.30mg/Kg),Nb(16.30mg/Kg),Sm(4.70mg/Kg).

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Table 3.Determining small amounts of scarce metals in the plant and its growing place soil by XRF technique

scarce metals	Weight percent of scarce metals in blank soil	Weight percent of scarce metals in of growing plac soil	Weight percent of scarce metals and metal ion in stem of the plant	Weight percent of scarce metals and metal ion in leaves of the plant
Sr	211.30	240.40	110.10	110.20
Y	24.30	20.80	19.3	19.10
Zr	252.80	228.90	163	164
Nb	12.30	20.70	16.80	16.10
Sn	8.30	7.30	4.00	7.30
Ba	311	341.10	255	230
Nd	32.70	38.20	36	34.60
Sm	5.50	5.50	4.70	5.80
Hf	11.80	9	3.43	5
Th	2.11	4.17	22.80	9.40

CONCLUSION

The chemical composition and mineral elements in *P. undulata* suggested that it can be used as an effective natural source of antioxidant and food additives and also a good candidate for phytochemical and pharmacological investigations to discover new broad pectrum bioactive compounds. The major minerals in *P. undulata* were K, Mg, Na, Fe and Ca which can be considered as a good source of nutrition. According the U.S.Pharmacopoeia,the lead limit for pharmaceutical products is 10 ppm.It is aacceptable limit for plant products,drugs and dietary supplements[9].Calcium is alsonecessary for blood coagulation,milk clotting and regulation of cell permeability [6,10].

REFERENCES

[1] Mogimi J. "In troducing some of pasture species in Iran"Arvan publishing, 2007;94-102.
[2] Zargari A.1997.Medicinal Plants, volume3, sixth edition, publish university of Tehran,1997; 80-106.
[3] Baranowska I,Srogi K, Wlochowicz A, , Szczepanik K. Polish Journal of Environmental,2002; Vol.11, 5:467-471.
[4] Ranjbari A. Identifcantion of mineral elements of dominant pasturing plants in four major regions of the province of Isfahan, M.A.dessertation, Faculty of Agriculture, university of Tarbiat Modarres Teacher truining. 1994.
[5] Sardashti AR, Sangtarash MH, Asadi A.IJACS, 2015;8(2): 142-148.
[6] Shahnawaz M,Sheikh S.A,Nizamani S.M ,Bhanger M,Afridi I and Ahmed E.Pakistan journal of nutrition.2012;11(2) :181-186.
[7] Blicharska E, kocjan R,Sowa I. Journal of .Annales.2006; 1, 67:329-333.
[8] Halverson JF , Smith J.Soil society of Arnerican Journal.1997; 61: 287-294.
[9] Tangahu BV, Sheikh SR, Basri A.H , Idris M, ,Anuar N, and Mukhlisin M. international journal of chemical engineering,2011;31.
[10] Yagi S, Alia ARE , Elhassan GOM, and M.A. Abdelhafeez.Journal of Applied and Industrial Sciences.2013; 1(**1**) 49-53.