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The Some Nutrient and Trace Elements Content of Wild Plants Using as Ethno botanical and Grown in the Gaziantep Region

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ABSTRACT

This study was to determine some elements concentration in a few plant used as food. We were collected six different native plants in Gaziantep and its neighbor villages. These plants and their common names; *Capsella bursa-pastoris* L. (Shepherd's-purse), *Rumex acetosella* L. (Sheep's sorrel), *Urtica dioica* L. (Nettles), *Portulaca oleraceae* L. (Verdolaga), *Malva neglecta* Wallr. (Mallow) and *Sinapis alba* L. (Wild mustard). The collected samples were cleaned, cut, and dried at 105 ◦C for 24 h. The samples were dissolved in 14 M HNO_3 and residues were dissolved in 1 M HCl after diluated 50 ml ultra-pure water. After mineralization, the metals were determined using an atomic absorption spectrophotometer. We were investigated contents of some nutrient and trace elements (Cu, Pb, Zn, Mn, Co, K, Fe, Ca and Na) in these plants. According to result of our study, especially *Portulacca oleraceae* L. high concentration than other plants in terms of Cu, Pb, Zn and K. Highest Na concentration identified the *Rumex acetosella* L. but, *Urtica dioica* L. is least concentration than other plants in terms of all elements. We identified as the result of study, *Portulaca oleraceae* L. inclined to accumulation to heavy metals.

INTRODUCTION

The importance of edible plants is increased with response to the rapid population growth. In the green grocer sand markets, today, these plants are more sold than previous years (Kaya et al., 2004). However, in developed and developing countries, a continuous increase in the production and consumption of certain elements, their spread to the environment and increases the likelihood of infection. An element, as well as on the need for processing may be confused with nature. In addition, the probability increases that the use of fertilizers in agriculture for the more crop (Ozbek et al., 1995). From the beginning of the industrial revolution in the heavy metal pollution of the environment has increased significantly (Celik et al., 2005; Shparyk et al., 2004). Soil, water and air, which can be found in different proportions lead to pollution of heavy metals on the specific concentration.

Accumulation of heavy metals in a common environment, increasing sizes are dangerous to all living things. All the elements that pollute the environment causes stress in plants. Stress affects the physiology of plants, their genetic potential changes, leading to the deaths of productivity constraints and produces large quantities of product losses (Zengin et al., 2003). Some of the elements are stored in various organisms used as food, and even the last member of the food chain in humans is known to cause acute poisoning (Takizava et al., 1975).

The plants are used as food, especially *Urtica dioica* L. and *Malva neglecta* Wallr. species and its mixtures are high demand by the public because it is source of natural antioxidant (Guder, 2008).

Bahemuka et al. (1999), determined that accumulation of heavy metals in the some natural plants (Cd, Cu, Pb, Zn) which they grew up surrounding farmland, the levels of these elements FAO and WHO have determined that they are above the levels specified.

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MATERIAL AND METHOD

Gaziantep province is in the Southeastern region in the Turkey, between 36°38° and 37°32° North latitudes 36°28° and $38^{0}01^{0}$ East longitudes (Figure 1). Its population is1.753.596 and it has 6.222 km^2 areas and 850 m of altitude.The climate of the study area is characterized as arid Mediterranean. Annual mean temperature is 15.2 ºC. According to 36 years the maximum mean temperature (M) is 27.9 ºC, in July and minimum mean temperature (m) is 3.3 ºC, in January. Annual rainfall is about 551.6 mm (Anonymous, 2010) and the seasonal precipitation regime is winter, spring, autumn and summer.

Fig. 1: Map of the study area.

Edible parts of wild plants were collected in Gaziantep in 2012. These plants and their common names; *Capsella bursa-pastoris* L. (Shepherd's-purse), *Rumex acetosella* L. (Sheep's sorrel), *Urtica dioica* L. (Nettles), *Portulaca oleraceae* L. (Verdolaga), *Malva neglecta* Wallr. (Mallow) and *Sinapis alba* L. (Wild mustard). Identify the species were made by us according to the Davis et al. (1965-1988). Our aim in selecting of these species were distribution range of these species, especially habitat available information for both the general distribution and floristic records in roadside areas, wet lands, such as the edges of the field is the fact that habitats of likely contamination **(Table 1).**

Method

The collected samples were cleaned, cut, and dried at 105 ºC for 24 h. All plant samples of 1 g were mineralization with 14 ml of HNO_3 (65%) and 5 ml of HCl (37%) in hot plate mineralization for 5 min and finally diluted to 50 ml with ultra-pure water. After mineralization, the metals were determined using an atomic absorption spectrophotometer (Perkin Elmer AAS 400). We were investigated contents of some nutrient and trace elements (Cu, Pb, Zn, Mn, Co, K, Fe, Ca and Na) in these plants. All analyses were carried out triplicate.

RESULTS AND DISCUSSION

In our study, metal and nutrient element concentrations of these plants species have been evaluated. Plant species were mostly collected from the wet land, road sides, edge of the field in rural areas. The table belongs to the results is given below (Table 2). In this study, 9 different elements have been analyzed.

Portulacca oleraceae, especially in terms of Cu, Pb, Zn, K elements have a higher level than the other analyzed samples. Although less to carry the other elements within the *Rumex acetosella* with a maximum Na content plant have been identified. Ca content was the emergence of a very small amount of the same type of plant grown in this area.Na salt of the earth where the parameters can be interpreted as the location of Ca salts.

Capsella bursa-pastoris, especially in terms of heavy metals, the highest emergence of Co is remarkable. These plants *Urtica dioica* has content at least one species in terms of almost all the elements are analyzed.

Many plant species used in agriculture in Turkey were carried out on the heavy metal. However, since the public markets in previous years studied, but these plants are on sale at the

Table. 1: Species and collection date, family and habitat of analyzed plants.

Species	Collection date	Habitat	Family
Capsella bursa-pastoris	May 25, 2012	Edge of the field	*Brassicaceae*
Sinapis alba	June 5, 2012	Roadside	*Brassicaceae*
Urtica dioica	May 10, 2012	Wetland	*Urticaceae*
Portulaca oleraceae	June 20, 2012	Edge of the field	*Portulaccaceae*
Malva neglecta	June 20, 2012	In the field	*Malvaceae*
Rumex acetosella	May 10, 2012	Wetland	*Polygonaceae*

Table. 2: Results of the investigation (mg/kg).

Plants	*Portulaca oleraceae*	*Capsella bursa pastoris*	*Urtica dioica*	*Sinapis alba*	*Malva neglecta*	*Rumex acetosella*
Elements	**Mean+sd mg/kg**	**Mean+sd mg/kg**	**Mean+sd mg/kg**	**Mean+sd mg/kg**	**Mean+sd mg/kg**	**Mean+sd mg/kg**
Cu	2.32±032	0.70±0.07	0.89±0.12	1.79±0.47	0.62±0.11	0.35±0.06
Pb	15.4±1.45	6.32±1.12	2.72±0.78	8.62±1.53	5.28±0.99	5.04±0.74
Zn	15.47±2.2	5.48±1.24	4.83±1.25	6.71±1.22	8.49±1.26	8.95±1.47
Mn	2.66±0.3	4.50±1.56	0.61±0.04	5.02±1.46	1.09±0.08	1.03±0.09
Co	0.06±0.01	0.15±0.02	0.02±0.01	N. D.	N. D.	N. D.
K	238.6±17.46	224.4±18.66	216±36.3	216,7±19.63	229.5±21.21	216.6±20.63
Fe	42.41±5.64	44.36±4.47	11.43±2.24	36.07±5.28	13.49±2.16	19.11±3.23
Ca	739.8±48.65	2.396±152.4	2.570±195.3	2.247±158.13	2.283±185.36	137.9±12.89
Na	3.88±0.85	2.90±0.58	3.58±0.84	04.31±0.66	4.35±0.77	7.70±1.32

Key; sd: Standard derivation,N.D: Not detected

contents of the bodies of wild plants embody elements of pharmacological levels of toxicity was practiced in recent years. For example, high nitrate and nitrite content is important, especially in terms of crops consumed raw. Tosun et al. (2003), investigated in terms of nitrate content of 20 different plant species where in Samsun and its surrounding grown and widely consumed around. Nitrate content of these plants have determined that varies between 32.10 - 8923.50 mg / kg.

A similar study, (Certel et al. 2006) nitrate content of 10 different edible wild plants (*Foeniculum vulgare*, *Raphanus sp.*, *Malva sylvestris*, *Urtica dioica*, *Papaver rhoeas*, (*Rumex acetosella*, *Pimpinella saxifraga*, *Taraxacum serotinum*, *Scolymus hispanicus*, and *Rumex obtisifolius*) offered for sale on the Antalya bazaars and it determined between 93.74 - 2512.12 mg / kg.

According to the results of both studies, appears to be important sources of nitrate content of wild plants.

The nitrate ion was having a lower toxicity and with the food, but there is a risk digestive system give rise to nitrite. Approximately 4-8% of dietary nitrate into nitrite in the body is expected; the nitrite has been reported, particularly in infants and young children caused by methaemoglobynemy (Zhong et al., 2002; Yucel et al., 2010).

According to another study, the levels of four different heavy metals [cadmium (Cd), lead (Pb), chromium (Cr) and copper (Cu)] were determined in various vegetables [garden cress (*Lepidium sativum*), leek (*Allium ampeloprasum*), parsley (*Petroselinum crispum*), sweet basil (*Ocimum basilicum*), and tarragon (*Artemisia dracunculus*)] cultivated around Sanandaj City in Iran. The contributions of the vegetables to the daily intake of heavy metals from vegetables were investigated. The average concentrations of each heavy metal regardless of the kind of vegetable for Pb and Cu were 13.60 ± 2.27, 11.50 ± 2.16 mg/kg, respectively. They reported, it is concluded that the vegetables grown in this region are a health hazard for human consumption (Maleki et al., 2008).

CONCLUSION

It is concluded from this study that the 9 different elements content 6 edible wild plant species which they using as ethno botanic in Gaziantep. Especially, the present study provides data on heavy metal pollution in Gaziantep. The content of heavy metals in the studied wild plants, and the permissible levels required for safe food were compared.High Zn and Pb content were found in *Portulacca oleraceae*. A high level of Cu was found in *Portulacca oleraceae* and *Sinapis alba*. People, should be taken when using native plants as food and theyshould be considered that collection of these plants areas whether or not forming regions dense pollution such as; industrial zones and urban areas. Because, these areas are includes high pollution potential in terms of heavy metal. Amount of these elements may be hazardous if they are taken in large quantities.

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