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Evaluation of Metal and Mineral Contents of Leafs, Stems and Roots of *C. Parviflorus Lam* and *C. Salviifolius L* Plants Growing at Al Ghabal Al-Khder (Libya)

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Abstract

This study was carried out on leafs and stems and roots of ***C. Parviflorus Lam*** and ***C. Salviifolius*** plants, which growing at Al –Gabal Al –Akhder region, Libya. The contents of some metals of (Na, K, Ca, N, P, Fe, Cu and Ni) were estimated in the leafs, stems and roots of the studied plants. Also, the results indicated that, the studied samples containing high values of anti-oxidants and important values of metals and minerals as (Na, K and Ca). High contents of potassium were recorded in stems comparing with roots and leafs. Also, important concentrations of Nitrogen and Phosphorus were recorded un the studied plants.

Keywords: Metals, Minerals, Nitrogen, Phosphour *C. Parviflorus Lam* and *C. Salviifolius L*

Introduction

Cistus plant which growing at Al-Gabal Al-Khder (Libya) was selected, the description of this plant can be summarizing as following: Family cistaceae comprises of 8 genera and 180 species, five genera native to the Mediterranean zone (***Cistus, Halimium, Helianthemum, Fumara*** and ***Tuberaria***). The genus ***Cistus*** is divided into 21 species (Bouyahya *et al*., 2017) [3], *Cistus* (from the Greek word kistos). This family is known is with Rock-Rose plants. (Papaefthimiou *et al*., 2014) [16]. These plants are beautiful shrubs and are identified of types according to color of their flowers (white or pink) (Guvenc *et al*., 2005) [6]. Distributed in all through the in Europe and Mediterranean locale and western Africa and Asia (Comandini *et al*., 2006) [4]. The Mediterranean locale is known to be the normal territory of the genus cistus (Skoric *et al*., 2012) [17]. These plants are able to grow in difficult climatic and soil dray or rocky conditions, (Aronne and Micco, 2001) [1]. The straight branches can run from (50 to 100 cm) in high. On the branches, leafs grow develop entangled and clear (Zalegh *et al*., 2021) [18]. The main ***Cistus*** species found in the Mediterranean basin namely ***C. albidus, C. creticus, C. crispus, C. parviflorus, C. monspeliensis, C. populifolius, C. salviifolius, C. ladanifer, C. laurifolius,*** and ***C. Clusii.*** (papaefthimiou *et al*., 2014) [16]. Most of the species of this family that have a sweet and fragrant aroma are highly prized in the perfume industry (Ben Jemia *et al*., 2013 [2] and El Euch, *et al*., 2015 [5]). The considers fundamental oil composition of ***Cistus*** species uncovered the presence oxygenated monoterpenes, sesquiterpenes, aromatics, oxygenated sesqui terpenes and traces of carbonyl compounds. Leafs of ***Cistus*** species are convered with organs emitting resin and basic oil comprising basically of terpenoids (Mastino *et al*., 2017) [14]. The leafs and stems of these lasting bushes have glandular tri chomes emitting a gum basically amid the summer months (Skoric *et al*., 2012) [17]. Two types of ***Cistus*** plant were selected in this study including: ***Cistus salviiflius*** and ***Cistus parviiflous***. The contents of Sodium, Potassium, Calcium, Nitrogen and Phosphorous beside some of heavy metals Cu, Fe and Ni were estimated.

Experimental Part

Sampling:

Selection of medicinal plants for this study:

Due to the importance of many plants which used at AL-Gabal AL-Khder region (Libya), this study was designed to select two

plants (*C. Parviflorus* and *C. Salviifolus*). The samples were collected from Al-Gabel Al –Kadar region.

Plants Taxonomy:
The collected samples were identified in *Seliphium* herbarium, Botany Department, Faculty of Science, Omar Al- Mukhtar University. The plant taxonomy was given in Table (1) and Figures (1 & 2).

Fig 1: C. *Parviflorus Lam*

Fig 2: C. S*alviifolius L*

Table 1: The taxonomy of the studied plants

Kingdom	Plant	
Clade	Tracheophytes and Angiosperms	Tracheophytes and Angiosperms
Family	***Cistaceae***	***Cistaceae***
Genus	***Cistus***	***Cistus***
Species	***C. Parviflorus Lam***	***C. Saiviifolius L***
Vernacular name	Torrashe Ahmar, Birabash Ahmar	Torrashe Abiad, Birabash Abiad

Samples preparation:
The leafs, stems and roots of the studied plants were separated and washing several times with distilling water. The samples then dried in dark and dry place. Then the samples were grinded by mortar and stored in polyethylene bottles until analysis. In this study the metal and minerals analysis of the studied samples were expressed as the following Codes:

Sample Code	Sample Type
A	*C. Parviflorus Leafs*
B	*C. Parviflorus Steams*
C	*C. Parviflorus Roots*
D	*C. Saiviifolius Leafs*
E	*C. Saiviifolius Steams*
F	*C. Saiviifolius Roots*

Determination of metals and minerals:
The mineral and metal contents of (Na, K, Fe, Ca, Cu, Ni, N and P) the studied samples were determined. The metals of (Cu, Fe and Ni), were determined with an atomic absorption (Perkin Elmer 800), (Lorenz *et al*., 1980) & (Masoud *et al*., 2014). Soluble sodium, Calcium and potassium contents measured by a Flame Photometer (JENWAY Flame Photometer) according to the method described by (Hasan, 2007 & Nabil *et al*., 2018 [15]). Nitrogen and Phosphorus were estimated by spectrophotometer by Nisler and Molybedate methods, respectively (Hasan & Mugahid, 2011).

Results and Discussion
Minerals and metals contents of leafs, steams and roots of studies plants:
The Minerals and metal contents in leafs, steams and roots of ***C. Parviflorus*** and ***C. Salviifolius*** was expressed in ppm are shown in Table 2 and Figures of (3–10). The concentrations of elements of the studied plants were fluctuated in the following ranges: The highest concentration of (K) were recorded in leafs of ***C. Parviflorus*** (76.28 ppm) followed by leafs of ***C. Salviifolius***, steams o f ***C. Parviflorus***, roots of ***C. Parviflorus*** and roots of ***C. Salviifolius*** (37, 33.571, 29.71, 11.71 and 7.85 ppm), respectively. The higher concentration of (Ca) was present in leafs of ***C. Salviifolius*** (41.428 ppm) followed by leafs of ***C. Parviflorus*** (30 ppm), steams of ***C. Salviifolius*** (21.428 ppm) then steams and roots of ***C. Parviflorus***, of (18.571 ppm) and in roots of ***C. Salviifolius*** (10 ppm). The (Na) was present in higher concentration in roots of ***C. Salviifolius*** (20.77 ppm) followed by steams of ***C. Salviifolius***, roots of ***C. Salviifolius***, steams, leafs and roots of ***C. Parviflorus*** (12.645, 10.979, 7.645, 7.229, 7.02 ppm), respectively. The higher concentration of (p) was present in roots of ***C. Salviifolius*** (23.434 ppm) followed by steams of ***C. Parviflorus***, leafs of ***C. Salviifolius, leafs*** of ***C. Parviflorus, steams*** of ***C. salviifolius*** and roots of ***C. Parviflorus*** (12.304, 11, 7.826, 7.608 and 6.173 ppm) respectively. While the higher concentration of (Fe) was recorded in leafs of ***C. salviifolius*** (1.922ppm) followed by roots of ***C. Salviifolius***, roots of ***C. Parviflorus***, leafs of ***C. Parviflorus***, steams of ***C. Salviifolius*** and steams of ***C. Salviifolius*** (1.143, 1.113, 0.485, 0.425 and 0.365 ppm) respectively, and there is no difference between ***C. Parviflorus*** and ***C. Salviifolius*** in nickel (Ni) and copper (Cu) contents. While the higher concentration of (N) was recorded in leafs of C. Salviifolius (0.976ppm) followed by steams of ***C. Salviifolius***, roots of C. Salviifolius, leafs of ***C. Parviflorus***, steams of ***C. parviflorus*** and roots of ***C. Parviflorus*** of values (0.905, 0.890, 0.875, 0.643 and 0.424 ppm), respectively. This study recorded presence of Ca, P, Na, k and Fe in the studied plants which are very important in human health. The differences in mineral contents are probably linked to genetic profile and partially to environmental conditions (Sayah *et al*., 2017). It was reported that, different factors which affecting on the distribution of minerals and metals in plants, they are including the type of soil around the plants growing, the water minerals, beside the loctains of plant growing, in addition to some of phsyological characterizations of each plant may be increase some metals and minerals in different parts of palnts (Hasan *et al*., 2010).

Table 2: Mineral and metal contents of leafs, steams and roots *C. **Parviflorus Lam** and **C. Salviifolius L*** (µg/g).

Elements / Samples	K	Na	Ca	P	Fe	Ni	Cu	N
A	76.285	7.229	30	7.826	0.485	0.177	15.758	0.875
B	29.714	7.645	18.571	12.304	0.365	0.163	15.413	0.643
C	11.714	7.02	18.571	6.173	1.113	0.148	14.896	0.424
D	37	12.645	41.428	11	1.922	0.148	15.068	0.976
E	33.571	10.979	21.428	7.608	0.425	0.177	14.896	0.905
F	7.857	20.77	10	23.434	1.143	0.163	15.586	0.890
Average	**32.69**	**11.04**	**23.33**	**11.39**	**0.908**	**0.162**	**15.26**	**0.785**
±SD	**24.43**	**5.28**	**10.94**	**6.32**	**0.605**	**0.012**	**0.36**	**0.209**

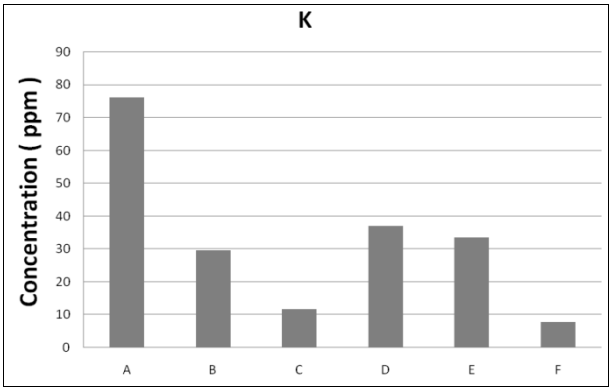

Fig 3: Total Potassium contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

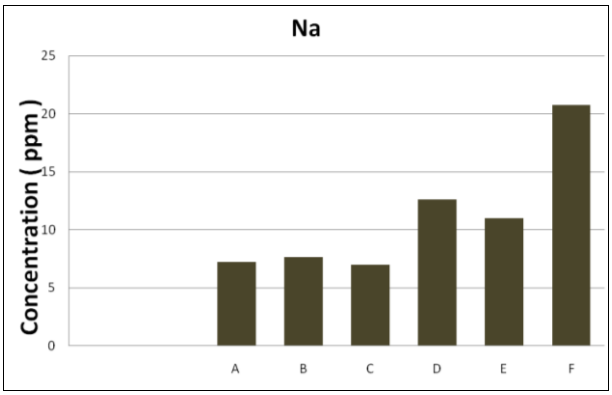

Fig 4: Total Sodium contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

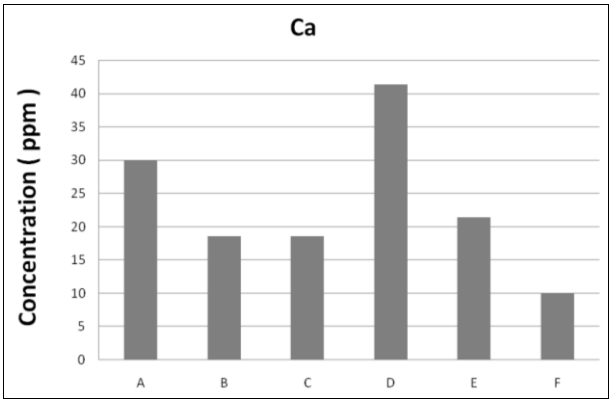

Fig 5: Total Calcium contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius*

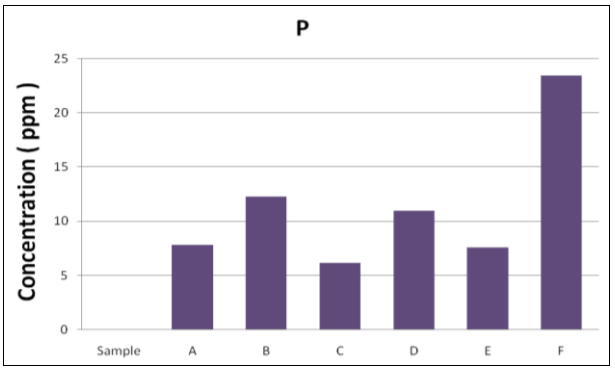

Fig 6: Total Phosphorus contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

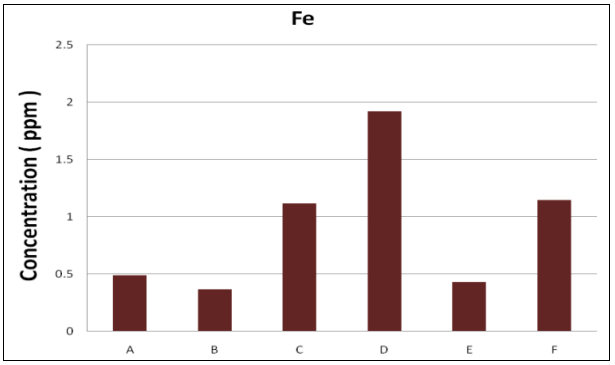

Fig 7: Total Iron contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

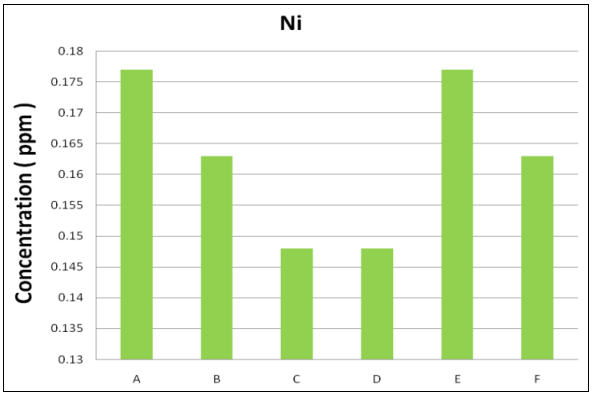

Fig 8: Total Nickel contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

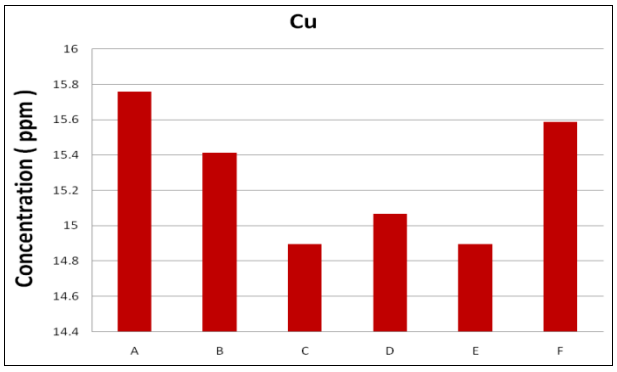

Fig 9: Total Copper contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

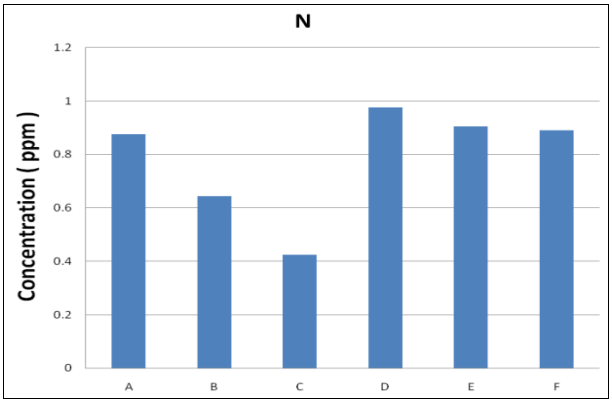

Fig 10: Total Nitrogen contents of leafs, steams and roots of *C. Parviflorus Lam and C. Salviifolius L*.

Conclusion

According to the results recorded in this study which different two plants showed different contents of metals and minerals in the studied tissues, there are wide variations in the minerals between the studied plants, the results of this study.

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