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Research Article

Total Lipids, Proteins, Minerals and Essential Oils of *Taraxacum Officinale* L. Growing Wild in Kosovo

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Abstract

Lipids, proteins, minerals and essential oils were quantitatively determined from the plant *Taraxacum officinale* L. Total proteins were analyzed, by Kjeldahl method, in root, stalk, leaves and flower in *Taraxacum officinale* L. growing in Lipjan (Kosovo). The levels of total proteins in root, stalk, leaves and flower are 48.80, 53.85, 56.00, 51.98%, respectively. Lipids are analyzed by Soxhlet extraction in root, stalk, leaves and flower. The mean levels of lipids in root, stalk, leaves and flower are 3.02, 3.88, 4.20, 8.50%, respectively. Determination of the lipid fraction was performed using thin layer chromatography. Using TLC we have determined four fractions of lipids with different polarity. This plant contains low quantity of lipids but it is very rich with proteins. The mineral content of *Taraxacum officinale* L., growing in Lipjan (Kosovo) was studied and analyzed by flame atomic absorption spectrometry. Five elements, sodium, potassium, iron, manganese, calcium, were determined at root, stalk, leaves and flower of *Taraxacum officinale* L. The mean levels of sodium, potassium, magnesium, calcium and iron are 0.78, 14.01, 4.25, 5.50, 0.85 mg/100 mg in root of *Taraxacum officinale* L., respectively. The mean levels of sodium, potassium, magnesium, calcium and iron are 0.61, 15.65, 2.00, 7.38, 0.19 mg/100 mg in stalk of *Taraxacum officinale* L., respectively. The mean levels of sodium, potassium, magnesium, calcium and iron are 0.26, 19.99, 4.02, 15.20, 2.98 mg/100 mg in leaves of *Taraxacum officinale* L., respectively. The mean levels of sodium, potassium, magnesium, calcium and iron are 0.21, 15.99, 2.55, 12.01, 0.28 mg/100 mg in flower of *Taraxacum officinale* L., respectively. From our investigation we can conclude that *Taraxacum officinale* L., contain more potassium than other elements. The calcium is more concentrated in leaves than other parts of *Taraxacum officinale* L. Iron is concentrated in higher amount in leaves and magnesium is distributed in equal amount in all part of *Taraxacum officinale* L. Essential oils were isolated using steam distillation. The mean levels of essential oils in root, stalk, leaves and pistil are 0.008, 0.067, 0.102, 0.098%, respectively. From the HPLC chromatogram we can see a lot of peaks which mean that we can isolate a lot of components that can have different biological activities. From the Chromatogram we can see that compound with Rf 19.72 is in higher amount compared with others.

1. INTRODUCTION

The soil and climatic conditions allow the growth of a lot of medical herbs in Kosovo. But, unfortunately we don't use these herbs so much and we don't pay enough attention to this field, even though there are possibilities for its development¹. In many countries of the world, the knowledge on medical herbs is transferred from generation to generation and they have a very special importance in folklore and in pharmaceutical medicines. The use and cultivation of medical herbs dates from Roman times. Until the XIX century and beginning of the XX century, medical herbs were the raw material for making medicines. Today, even though obtaining active material from synthetic chemical components is great, the use of medical herbs in medicine is widespread and is important². There is an increasing demand for natural products as curative agent. The medicinal plants are as primary sources for natural products. The medicinal plants are used not only in the poorer countries but also in developing countries as alternatively way to treat different diseases³⁻⁵.

Our research group is interested to analyze the chemical profile of different medicinal plants which are growing wild in the region of Kosova and Albania⁶⁻⁹. One of them is *Taraxacum officinale* L. which is the medicinal plants that have been used for a long time as

a protective and curative remedy for some disorders¹⁰⁻¹². *Taraxacum officinale* L. is a large genus and belong to the *Asteraceae* family¹³.

In the literature exists a lot of studies about the chemical nature of *Taraxacum officinale* L.¹⁴⁻¹⁶. The aim of our study was to analyze the chemical composition of *Taraxacum officinale* L. growing wild in Kosovo.

2. MATERIALS AND METHODS

The aerial part of *Taraxacum officinale* L., growing wild in Lipjan (Kosovo), was collected in May 2012. Voucher specimens were deposited in the Herbarium of the Department of Veterinary, University of Prishtina. All samples were collected at full flowering stage. The plants were dried at room temperature (22°C).

Proteins were determined according to the Kjeldahl method, whereas lipids were determined according to the Soxhlet method. Determination of the lipid fraction was performed using thin layer chromatography. The mineral content of *Taraxacum officinale* L. was investigated using Atomic Absorption Spectrometry (AAS). The essential oil of *Taraxacum officinale* L. was extracted with steam distillation for 4 h of 100 g of air dried plants. The profile of the EtOAc extract was done with High-performance liquid chromatography.

3. RESULTS AND DISCUSSION

Taraxacum officinale L. was analyzed in chemical aspect with the goal to research the chemical nature of this plant. We have

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analyzed the primary and secondary metabolites in quantity manner. The amount of lipids from different parts of *Taraxacum officinale* L. is given in Table 1.

Table 1: Lipids amounts on *Taraxacum officinale* L.

Parts of plant	Percentage (%)
Root	3.02
Stalk	3.88
Leaves	4.20
Flower	8.50

Figure 1 shown the diagrams for the lipids amount to the *Taraxacum officinale* L. giving in percentage.

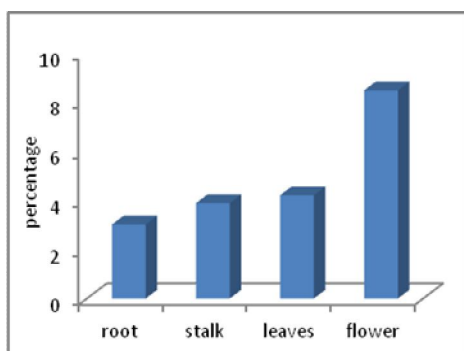


Figure 1: Lipids amount of *Taraxacum officinale* L.

From Figure 1. we can see that the higher amount of lipids to the plant *Taraxacum officinale* L. is in flower and in other parts of the plant lipid amount is approximately the same. The average level of lipids in the root, stalk, leaves and pistil is 3.02, 3.88, 4.20, and 8.50% respectively.

On the TLC the four separate lipid fractions are isolated from the flower. In Figure 2. presented the development of chromatographic plate and lipid fractions from the floral plant *Taraxacum officinale* L. growing wild in the region of Lipjan.

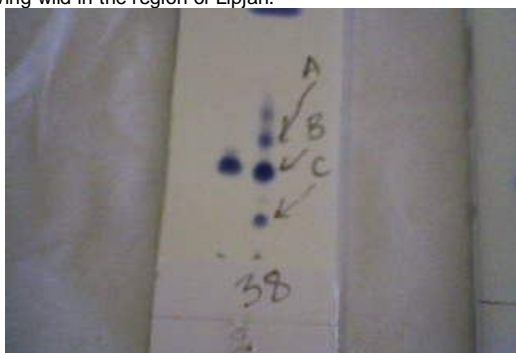


Figure 2: Fractions of lipids extracted from plant *Taraxacum officinale* L. (2% acetone in CH_2Cl_2)

The amounts of proteins are given in Table 2.

Table 2: Proteins amount on *Taraxacum officinale* L.

Parts of plant	Percentage (%)
Root	48.80
Stalk	53.85
Leaves	56.00
Flower	51.98

In Figure 3 we can see the amount of protein in four parts of the plant *Taraxacum officinale* L. expressed as a percentage. The table and the chart are seen that the level of total protein in the roots, stalk, leaves and pistil is 48.80, 53.85, 56.00, and 51.98% respectively. From these results we have observed that all parts of the plant contain almost the same amount of protein. So we have a uniform distribution of proteins throughout the entire plant. Slightly smaller amount of protein noticed in the root. From the above results we can conclude that this plant contains small amounts of lipids but is extremely rich in proteins.

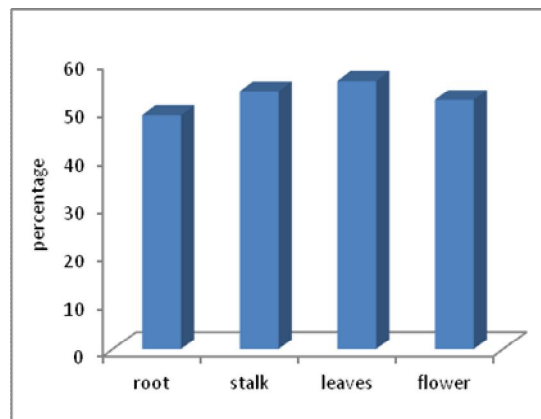


Figure 3: Proteins amount in *Taraxacum officinale* L.
The amount of essential oil from different parts of *Taraxacum officinale* L. is given in Table 3.

Table 3: Essential oil amount in *Taraxacum officinale* L.

Parts of plant	Percentage (%)
Root	0.008
Stalk	0.067
Leaves	0.102
Flower	0.098

From the data presented in Table 3 we can see that *Taraxacum officinale* L. plant contains very small amount of essential oil. On leaves the amount is 0.102% and this value is higher in comparison with the isolated quantities of essential oil from other parts of the plant. Roots contain very small amount of essential oil 0.008% (Figure 4).

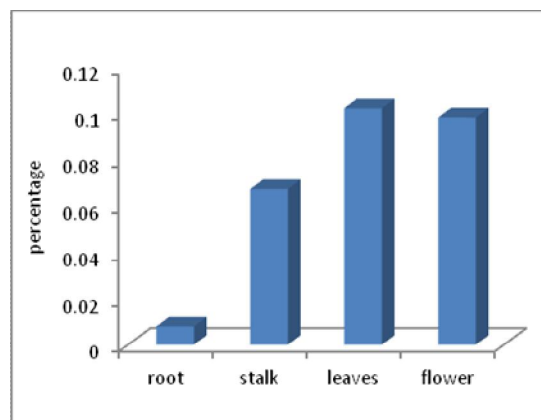


Figure 4: Essential oil amount of *Taraxacum officinale* L.

From the HPLC chromatogram we can see a lot of peaks which mean that we can isolate a lot of components that could have different biological activities. From the chromatogram we can see

that compound with Rf 19.72 is in higher amount compared with others.

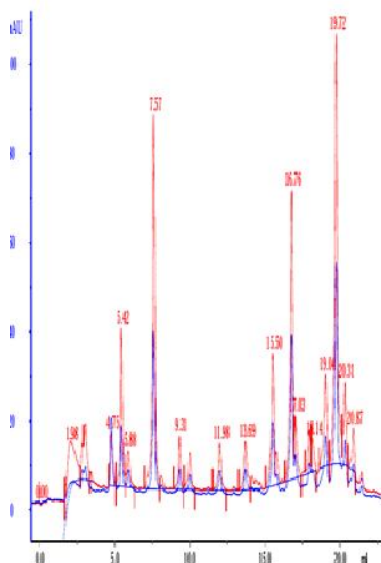


Figure 5: The HPLC profile of the EtOAc extract of the *Taraxacum officinale* L.

The amount of elements from different parts of *Taraxacum officinale* L. is given in Table 4.

Table 4: The amount of elements in mg/100 mg of *Taraxacum officinale* L. plant.

Parts of plant	Na	K	Mg	Ca	Fe
Root	0.78	14.01	4.25	5.50	0.85
Stalk	0.61	15.65	2.00	7.38	0.19
Leaves	0.26	19.99	4.02	15.20	2.98
Flower	0.21	15.99	2.55	12.01	0.28

From the table 4 we can see that the root is rich in potassium 14.01%, but also contains a lot of amounts of calcium and magnesium. Magnesium and calcium are nearly in same amount. While the amount of iron and sodium is much smaller than 1%. Figure 6 shows the diagram of the elements which are present in roots of the plant *Taraxacum officinale* L.

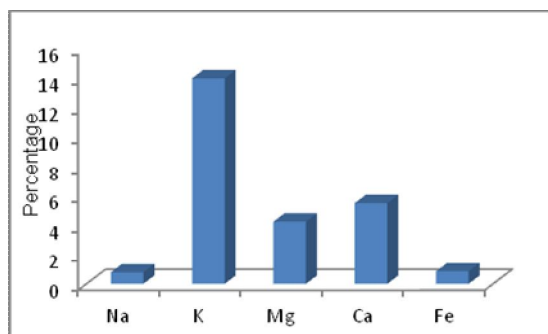


Figure 6: Diagram of the quantity of elements in roots of *Taraxacum officinale* L.

Stalk contains potassium which is present in the amount 15.65%. In root the amount of calcium is lower than the stalk 1.88%. Also in the stalk the amount of iron and sodium is low 0.61% 0.19% respectively. Figure 7 shows the elements quantity in the stalk plant *Taraxacum officinale* L.

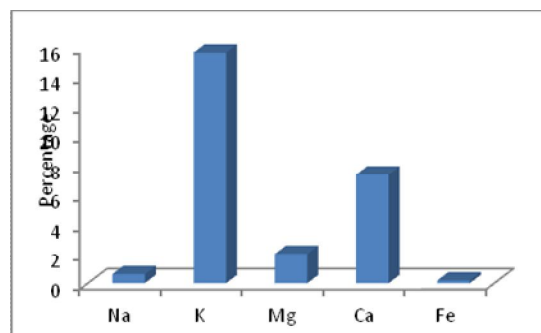


Figure 7: Diagram of the quantity of elements in stalk of *Taraxacum officinale* L.

Also from Table 4, we noticed that the leaves have large amounts of potassium (19.99%) compared to the root and stems. Also the amount of calcium in the leaves (15.20%) is much higher in comparison with the quantity of his roots and stems. In leaves is presence higher amounts of iron of 2.98%. Sodium is in small amounts as the stalk and roots (Figure 8).

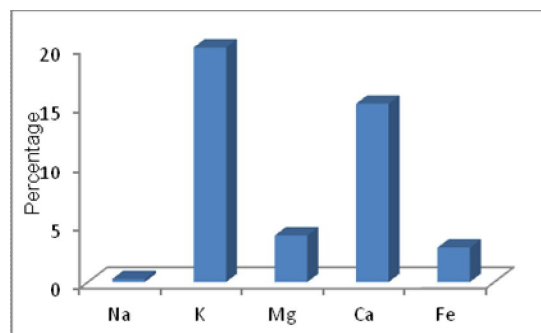


Figure 8: Diagram of the quantity of elements in leaves of *Taraxacum officinale* L.

In table 4 we can see that flowers of *Taraxacum officinale* L. contain a higher amount of potassium (15.99%) and Calcium (12.01%). Sodium and iron are present in lower amount 0.21% and 0.28% respectively. In Figure 9 is the diagram of the elements in the flower of *Taraxacum officinale* L.

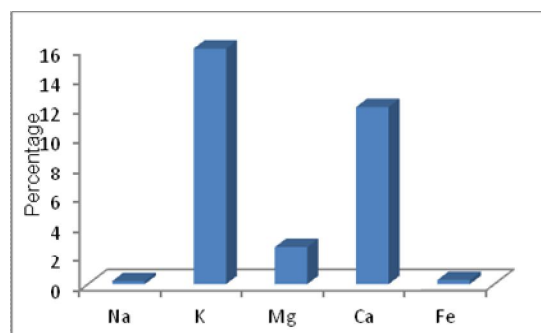


Figure 9: Diagram of the quantity of elements in flower of *Taraxacum officinale* L.

Based on the quantitative determination of these elements we may conclude that potassium is uniformly distributed in the whole plant *Taraxacum officinale* L. growing wild in the region of Lipjan. Sodium is at least greater amount present in the roots (0.78%), compared with the leaves and flower. Calcium is more concentrated in the leaves (15.20%) than in other parts of the plant. Iron is also concentrated in the leaves (2.98%), and it can be as main characteristic of this plant.

4. CONCLUSION

Lipids are analyzed by Soxhlet extraction in root, stalk, leaves and flower. The mean levels of lipids in root, stalk, leaves and flower are 3.02, 3.88, 4.20, and 8.50% %, respectively. The level of lipids in this plant is very low. The higher value of lipids are found in flower. In other parts of this plants the concentration was low.

Total proteins were analyzed by Kjeldahl method, in root, stalk, leaves and flower in *Taraxacum officinale* L. growing wild in Lipjan, on May 2012. The levels of total proteins in root, stalk, leaves and flower are 48.80, 53.85, 56.00, and 51.98% respectively. *Taraxacum officinale* L. growing wild in Lipjan (Kosova) contain high amount of proteins. This plant is very rich with proteins. The distribution of the proteins are in equal manner in all parts of plants.

Essential oils were isolated by hidrodistillation. *Taraxacum officinale* L. growing in the region of Lipjan (Kosova), contains small amount of essential oil. The values which we have obtained were lower than 1%. *Taraxacum officinale* L. Growing wild in Lipjan, contains low quantity of lipids and essential oil but it is very rich with proteins.

The mineral content of *Taraxacum officinale* L. growing in Lipjan, was studied and analyzed by flame atomic absorption spectrometry (SAA). Five elements, sodium, potassium, manganese, calcium and iron were determined at root, stalk leaves and flower of *Taraxacum officinale* L. The levels of sodium, potassium, manganese, calcium and iron are 0.26, 19.99, 4.02, 15.20, 2.98 mg/100 mg in leaves of *Taraxacum officinale* L, respectively. The mean levels of sodium, potassium, manganese, calcium and iron are 0.61, 15.65, 2.00, 7.38, 0.19 mg/100 mg in stalk, respectively. The mean levels of sodium, potassium, manganese, calcium and iron are 0.78, 14.01, 4.25, 5.50, 0.85 mg/100 mg in root of *Taraxacum officinale* L. respectively. The mean levels of sodium, potassium, manganese, calcium and iron are 0.21, 15.99, 2.55, 12.01, 0.28 mg/100 mg in flower of *Taraxacum officinale* L, respectively. From our investigation we can conclude that *Taraxacum officinale* L. contain more potassium than other elements. The calcium is more concentrated in leaves than in other parts of *Taraxacum officinale* L. Iron is present in higher amount in leaves (2.98%). Sodium and manganese are distributed in equal amount in all parts of *Taraxacum officinale* L. growing wild in Lipjan (Kosova).

REFERENCES

- Mehmeti A, Sherifi E, Demaj A, Medical Herbs (European Agency for Reconstruction), First edition, Prishtinë, 2007, 5.
- Sujata B, Bhimsen A, Meenakshi S, Chemistry of Natural Products, First Edition, Springer, Berlin 2005, 44.
- Soomro T, Zahir E, Mohiuddin S, Khan N, Naqvi LL, Quantitative Assessment of Metals in Local Brands of Tea in Pakistan, Pakistan Journal of Biological Sciences, 2008, 11(2): 285-289.
- Karak T, Bhagat R, Trace elements in tea leaves, made tea and tea infusion: A review, Food Research International, 2010, 43(9): 2234-2252.
- Diacony D, Diacony R, Navrotescu T, Estimation of heavy metals in medicinal plants and their infusions, Ovidius University Annals of Chemistry, 2012, 23(1): 115-120.
- Faiku F, Haziri A, Domozei B, Mehmeti A, Total lipids, proteins, minerals and essential oils of *Tussilago farfara* (L.) from south part of Kosova, European Journal of Experimental Biology, 2012, 2(4): 1273-1277.
- Haziri A, Faiku F, Mehmeti A, Govori S, Abazi S, Daci M, Haziri I, Bytyqi-Damoni A, Mele A, Antimicrobial properties of the essential oil of *Juniperus Communis* (L.) growing wild in east part of Kosovo, American Journal of Pharmacology and Toxicology, 2013, 8(3): 128-133.
- Haziri A, Aliaga N, Ismaili M, Govori S, Leci O, Faiku F, Arapi V, Haziri I, Secondary Metabolites in Essential of *Achillea millefolium* (L.) Growing Wild in East Part of Kosovo, American Journal of Biochemistry and Biotechnology, 2010, 6(1): 32-34.
- Haziri A, Govori S, Ismaili M, Faiku F, Haziri I, Essential oil of *tanacetum parthenium* (L.) from east part of Kosova, American Journal of Biochemistry and Biotechnology, 2009, 5(4): 226-228.
- Akeel M, Teb Al-emam Ali, First Edition, Dar Al-Mahaga "El-bedaa" for press, Burit, Lebanon, 1996, 100-105.
- Mascolo N, Autore G, Capasso F, Menhini A, Fasulo P, Biological screening of Italian medicinal plants for anti-inflammatory activity, Phytotherapy Research, 1987, 1: 28-31.
- Newall A, Anderson A, Phillipson D, Herbal Medicines. A Guide For Health-Care Professionals, The Pharmaceutical Press, London 1996, 9.
- Simon E. Essential oil and culinary herbs, New crops. John Wiley & Sons, Inc., 1993, 472-483.
- Gjorgieva D, Kadifkova-Panovska T, Baceva K, Stafilov T, Content of toxic and essential metals in medical herbs growing in polluted and unpolluted areas of Macedonia, Arh Hig Rada Toksikol., 2010, 61: 297-303.
- Gjorgieva D, Kadifkova-Panovska T, Baceva K, Stafilov T, Metalic Trace Elements in Medicinal Plants from Macedonia, Middle-East Journal of Scientific Research 2011, 7(1): 109-114.
- Bylka W, Matlawska I, Franski R, Essential oil composition of *Taraxacum officinale*, Acta Physiologiae Plantarum, 2012, 32(2): 231-234.