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Total lipids, proteins, minerals and essential oils of *Tussilago farfara* (L.) from south part of Kosova

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ABSTRACT

Lipids, proteins, minerals and essential oils were quantitatively determined from the plant *Tussilago farfara* L. (Asteraceae) growing wild in Sharr (south part of Kosova). 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. Using TLC we have determined five fractions of lipids with different polarity. Essential oils were isolated using steam distillation. The mineral content of *Tussilago farfara* L. (Asteraceae) was investigated using Atomic Absorption Spectrometry (AAS). Seven elements, iron, calcium, potassium, magnesium, copper, sodium, and zinc, were determined in this plant. From our results we can conclude that *Tussilago farfara* L. (Asteraceae), growing wild in the south region of Kosova contain: lipids 1.745 %, proteins 2.477 %, essential oils 0.111 %, iron 0.912 %, calcium 0.463 %, potassium 0.295 %, magnesium 0.228 %, copper 0.081 %, sodium 0.057 %, zinc 0.0353 %. It is evident that iron is present in larger amounts in this plant compared to other elements.

Key words: Total proteins, lipids, minerals, essential oils, *Tussilago farfara* L. (Asteraceae), Kosova.

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 development [1]. 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 important [2].

Tussilago farfara L. (Compositae) is a perennial herb that is widely spread in Korea, China, North Africa, Siberia, and Europe [3]. The basal leaves appear after the flowers have wilted and are roughly heart shaped, irregularly lobed with a toothed margin. In the early spring, coltsfoot grows to 5-20 cm tall and produces yellow floral heads

reminiscent of dandelion [1]. According to Meseyton, coltsfoot has been used for thousands of years as an herbal remedy in ancient Chinese medicine [4]. The flower buds of *Tussilago farfara* L. are known as an important folk medicine used in the treatment of cough and wheezing [3]. To relieve other respiratory ailments such as shortness of breath, asthma and bronchitis, old folk recipes called for inhaling the vapors of fresh or dried coltsfoot leaves or flowers boiled in water [4].

However, besides therapeutic bioactive compounds, this herb has been found to contain toxic pyrrolizidine alkaloids, mainly senkirkine and traces of senecionine [5, 6].

The research in the chemical nature of the different plants was done from different author [7-15]. The aim of this research was to determine the quantity of proteins, lipids, minerals and essential oil of the *Tussilago farfara* L. (*Asteraceae*) from the mountain Sharr (Kosova).

MATERIALS AND METHODS

The aerial part of *Tussilago farfara* L. (*Asteraceae*) growing wild in Shar (south part of Kosova), was collected in April 2011. 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 *Tussilago farfara* L. (*Asteraceae*) was investigated using Atomic Absorption Spectrometry (AAS). The essential oil of *Tussilago farfara* L. (*Asteraceae*) 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.

RESULTS AND DISCUSSION

Tussilago farfara L. (*Asteraceae*) was analysed in chemical aspect with the goal to research the chemical nature of this plant. We have analysed the primary and secondary metabolites in quantity manner. In table 1 we show the quantity of lipids, proteins, essential oil in the *Tussilago farfara* L. (*Asteraceae*).

Table 1: The amounts of lipids, proteins and essential oil of the *Tussilago farfara* L. (*Asteraceae*)

Komponents (%)	Sample 1	Sample 1	Sample 1	Average values	
Lipids	1.703		1.981	1.552	1.745
Proteins	2.493		2.685	2.254	2.477
Essential oil	0.164		0.070	0.099	0.111

From experimental data we can see that the amounts of lipids were 1.745%, proteins 2.477%. The amount of essential oil in the *Tussilago farfara* L. (*Asteraceae*) plant was 0.111%. We did three measurements for each parameters.

Determination of the lipid fraction was performed using thin layer chromatography. Developing the TLC of the lipids we can see five fractions. In figure 1 we show the TLC and fractions of the lipids with different polarity.

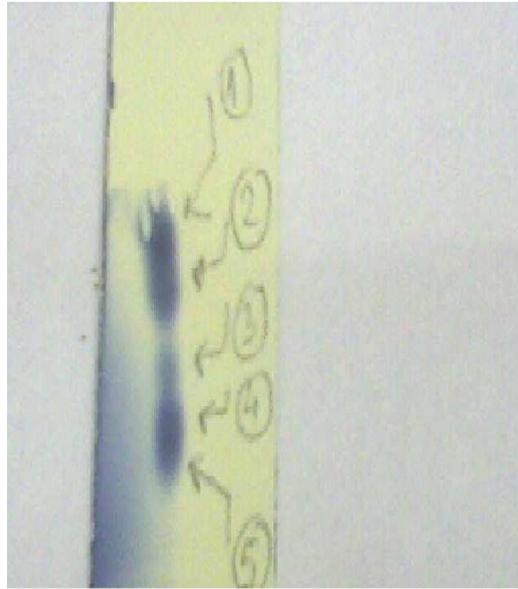


Figure 1: Determination of the fractions of lipids from *Tussilago farfara* L. (Asteraceae)

From the HPLC chromatogram we can see a lot of picks which mean that we can isolate a lot of komponents 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.

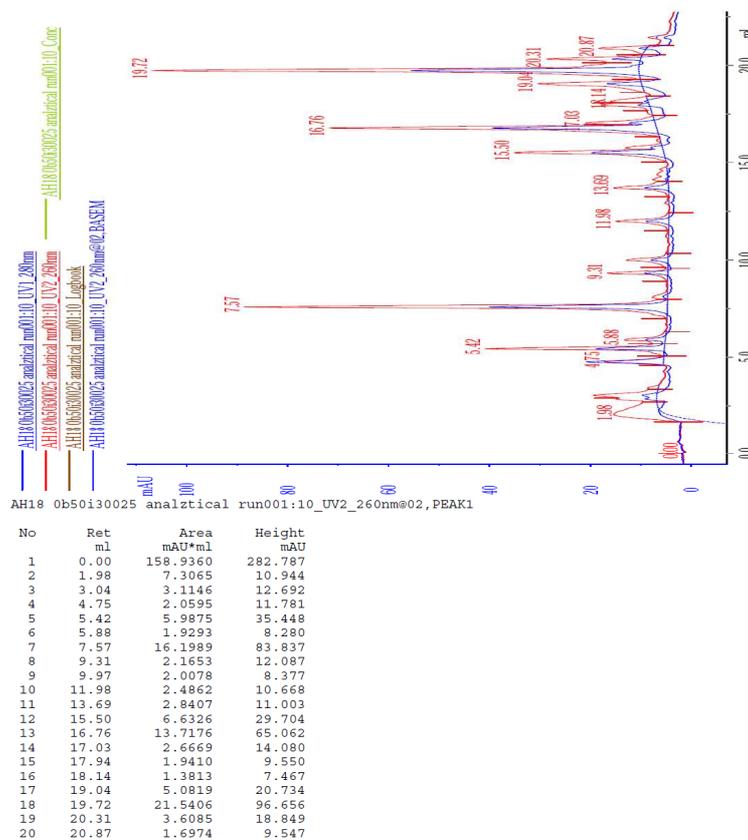


Figure 2: The HPLC profile of the extract of the *Tussilago farfara* L. (Asteraceae)

From figure 3 we can see that the contains of lipids proteins and essential oil in *Tussilago farfara* L. (*Asteraceae*) was in this ratio protins, lipids and essential oil.

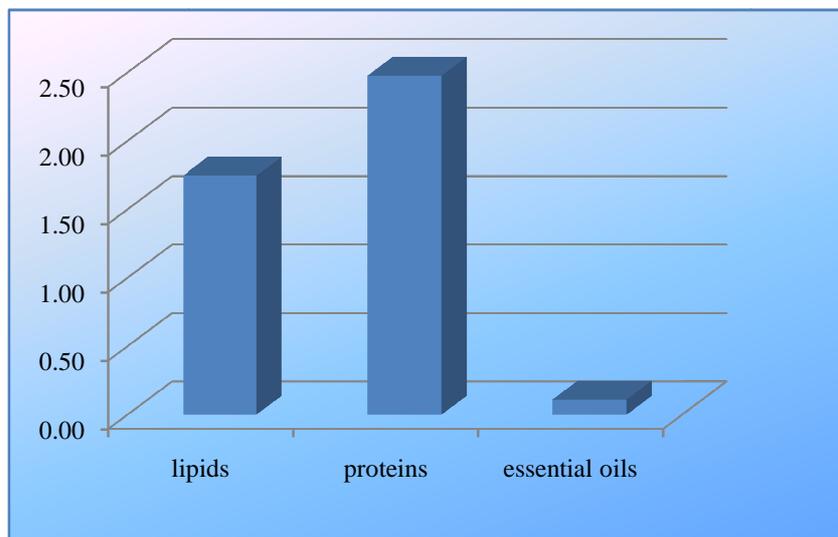


Figure 3: The diagram of the quantity of the lipids, proteins and essential oil of the *Tussilago farfara* L. (*Asteraceae*).

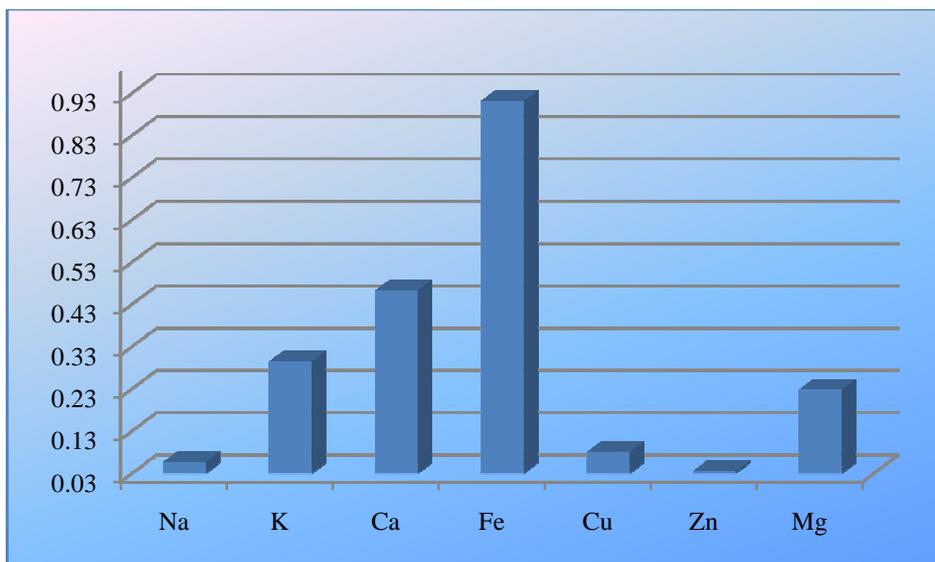


Figure 4: Diagram of the quantities of the elements in the plant *Tussilago farfara* L. (*Asteraceae*)

Also we did the research in the quantity of the minerals sodium, potassium, calcium, magnesium, iron, copper and zinc. In table 2 we show the quantity of minerals in the *Tussilago farfara* L. (*Asteraceae*).

In figure 4 we can see that the ration of the elemets was in this order iron, calcium, patassium, magnesium, coper, sodium and zinc.

From the experimental data we can conclude that the biological activity of this plant depends from the minerals and from the nature of the essential oil .

Table 2: Quantity of minerals in the plant *Tussilago farfara* L. (Asteraceae), growing wild in Shar montain (Kosova)

Element (%)	Sample 1	Sample 1	Sample 1	Average values			
Sodium	0.055		0.082	0.033			0.057
Potassium	0.297	0.465		0.124		0.295	
Calcium	0.464		0.580	0.345			0.463
Magnesium	0.326		0.194	0.165			0.228
Copper	0.061		0.100	0.082			0.081
Zinc	0.053		0.014	0.039			0.0353
Iron	0.713		1.104	0.920			0.912

From the table 2 in figure 4 we show the diagram of the quantities of the elements in the Tussilago farfara L. (Asteraceae)

CONCLUSION

Minerals, lipids, proteins and essential oils were quantitatively determined for the plant *Tussilago farfara* L. (Asteraceae), which grows in the Sharr region.

Proteins were determined according to the Kjeldah method, whereas lipids were determined according to the Soxhlet method. Determination of the lipid fraction was performed using thin layer chromatography. Five fractions of lipids isolated from this plant were separated from the developed chromatographic plate. The mineral content of *Tussilago farfara* L was investigated using Atomic Absorption Spectrophotometry (AAS). Seven elements, iron, calcium, potassium, magnesium, copper, sodium, and zinc, were determined in this plant. Etheric oils were isolated using steam distillation. According to the experimental data we may conclude that *Tussilago farfara* L, which grows in the Sharr region (Kosovo), contains: lipids 1.745 %, proteins 2.477 %, essential oil 0.111 %, iron 0.912 %, calcium 0.463 %, potassium 0.295 %, magnesium 0.228 %, copper 0.081 %; sodium 0.057 %, zinc 0.0353 %. It is evident that iron is present in larger amounts in this plant compared to other elements. The plant under investigation contains proteins in larger amounts compared to lipids, whereas the essential oil content is very low. Let's hope that in the future programs of agricultural policies of our country, through developmental programmes in different private enterprises and municipalities, this field will get the attention it deserves.

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