

Determination of Some Heavy Metals and Phytochemical Analyses of *Teucrium polium* (*Lamiaceae*) Plant Used as Traditional Drug

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Outlines:

1. Introduction and literature review
2. The aim of the work
3. Methodology
4. Results and discussion
5. Conclusion



Teucrium polium (L):

- *T.polium* a perennial wild flowering plant of the *Lamiaceae* family, is distributed throughout North Africa, Europe, and South-Western Asia.
- They usually grow in dry, stony areas.
- The plant's stem is upright and can reach a maximum length of 10-35 cm.
- The anatomy of the upper limbs of the body seems fully branching.
- It blooms from April to August in a variety of colors, from pink to yellow.

Teucrium polium (L):

- In traditional **Iranian** medicine, *T.polium* is used to treat various pathological conditions, such as gastrointestinal problems, diabetes, rheumatism, and inflammations.
- Traditional **Saudi** Arabian medicine uses infusions made from the aerial parts and sensitive leaves of *T.polium* to treat intestinal, and stomach.
- *T.polium* is used to treat a wide range of conditions in **Jordan**, including cancer, fever, inflammation, rheumatism, diabetes, kidney stones, and pain.
- **Turkish** traditional medicine uses its aerial components as infusions to treat eczema and hemorrhoids.

Teucrium polium (L):



The aim of the work

The aim of the study is :

- To determine some heavy metals in the *Teucrium polium L* plant by using FAAS
- To perform phytochemical analysis of the *Teucrium polium L* plant.



Methodology:

Sample collection and preparation:

- The sample was collected from *Darna* mountain region before the flood.
- Samples are washed by distilled water and dried under shade.
- Part of the dried samples are then, ground and powdered with a grinder.
- The second part of the sample is not grounded

Teucrium polium L



Before drying



After cleaning and drying



After grinding

Methodology:

➤ Acid-digested extract preparation:

- *T.polium* samples were gently ground and then sieved. The sieved samples were dried at 90°C for 24 hours. After weighing 2g of *T.polium*, aliquots of 10 ml of highly pure concentrated nitric acid were applied before reaching boiling point, the mixture was heated for 15 min and then cooled.
- This procedure was repeated twice with an additional 5 ml of concentrated nitric acid and heating for 30 min.

Methodology:

➤ Acid-digested extract preparation:

- After that 5 ml of 30% hydrogen peroxide was added dropwise followed with 10 ml of 14 M nitric acid.
- The digested extracts were filtered through Whatman No. 40 filter papers, and the volume of the polyethylene volumetric flasks was reduced to 100 ml by using deionized water then FAAS from Anlytikjena was used to analyze metals.

Extraction by nitric acid and hydrogen peroxide:

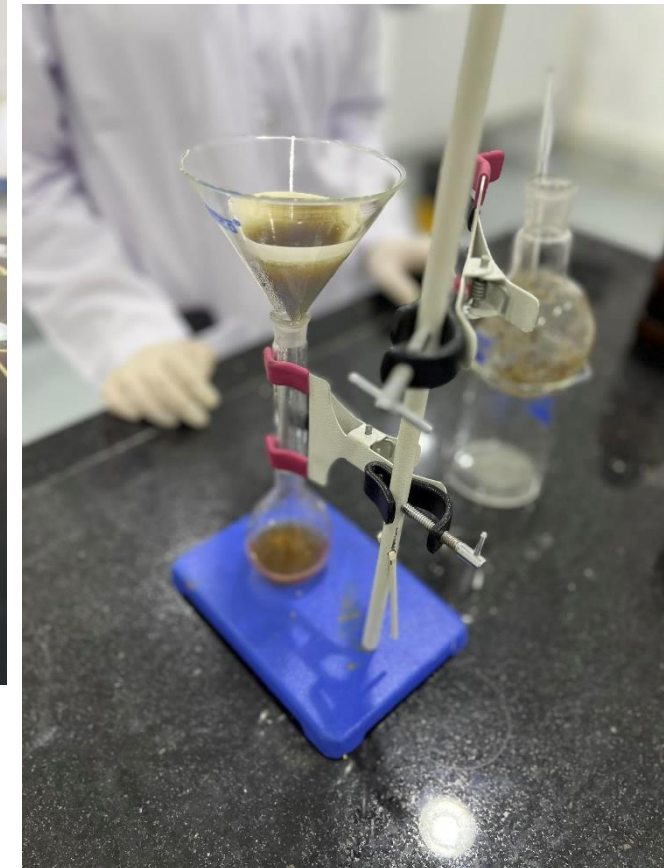
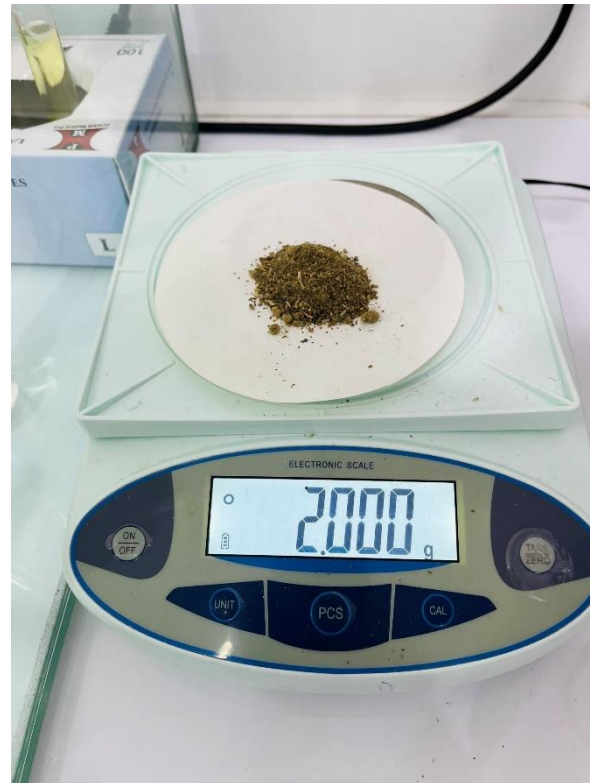


Methodology:

➤ Tea extraction:

Firstly, weighted 2g of powder *T.polium* then putted into flask, after that add 50 ml of distilled water then boiling and the final step is filtered the *T.polium* tea through Whatman No. 40 filter paper then finally analysed by using FAAS.

Tea extraction:

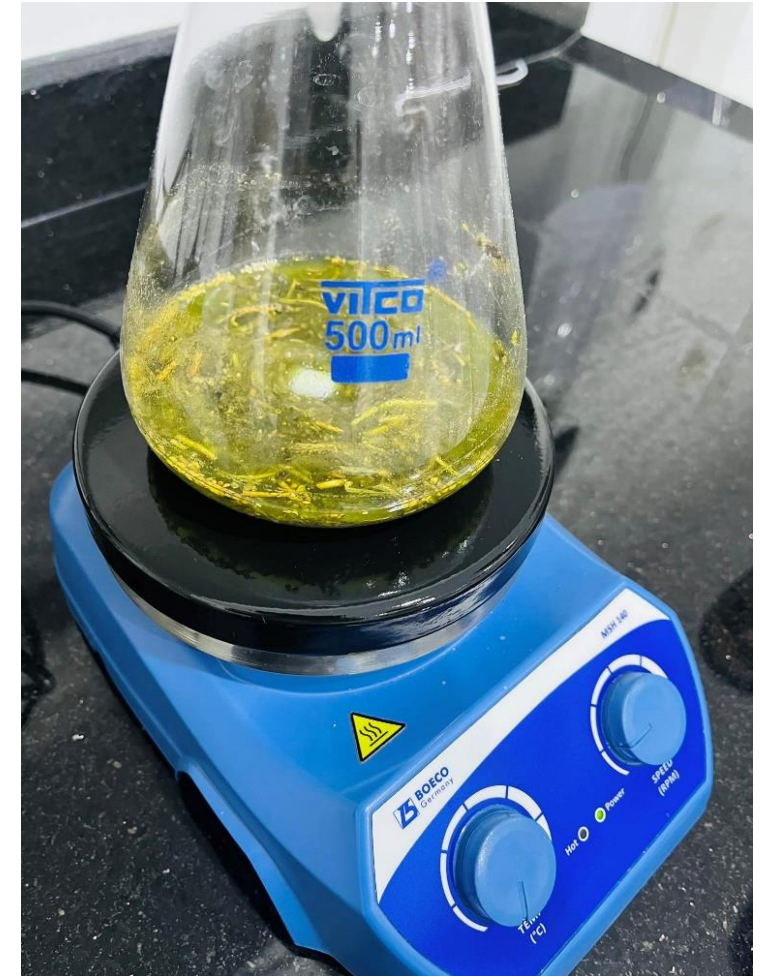


Methodology:

➤ Methanol extraction:

T.polium samples were gently ground, then putted 25.8g of *T.polium* into a conical flask after that add 320 ml of methanol then put into a stirring machine (BOECO Germany MSH 140, Voltage: 220V (50/60Hz), Power Consumption: 310W, Maximum Speed: 2200 RPM, Serial No: IAE1806AA0050) without heat on maximum speed for about 8 days then used for phytochemical screening.

Methanol extraction:



Qualitative phytochemical analysis:

➤ Test of tannin:

Tannins were present if, after mixing two milliliters of the filtrate with a few drops of 1% ferric chloride solution, a blue-black, green, or blue-green precipitate formed.

➤ Test of Gelatin:

The gelatin in a 1% solution was prepared to react with the extract. The development of precipitate having a white color demonstrates the presence of gelatine.

Qualitative phytochemical analysis:

➤ Test of terpenoids:

After dissolving the crude extract in 2ml of chloroform, it was dried out. A reddish-brown coloration at the interface indicated the presence of terpenoids after 3 ml of concentrated H₂SO₄ was added.

➤ Test of steroids:

Crude extract was mixed with 2ml of chloroform and concentrated H₂SO₄ was add sidewise. The bottom chloroform layer developed a red color that indicated the presence of steroids.

Qualitative phytochemical analysis:

➤ Test of phenolic:

5 milliliters of purified water were used to dissolve about 500 mg of the extract. This was diluted with a tiny amount of 5% neutral ferric chloride solution. When a blue or green tint begins to take shape, phenols are involved.

➤ Test of saponin:

After dissolving the extract in 5 ml of distilled water, the mixture was shaken. The production of foam is a sign that saponins are present.

Results and discussion:

Table 1. FAAS results for heavy metals in *T.polium L* ($\mu\text{g/g}$) tea and acid extract.

Element analyzed	Tea extract average	Acid digest average
Pb	N.D	N.D
Ni	21 $\mu\text{g/g}$	21.1 $\mu\text{g/g}$
Cd	2.97 $\mu\text{g/g}$	6.27 $\mu\text{g/g}$
Co	N.D	N.D
Cr	N.D	0.62 $\mu\text{g/g}$
Mn	N.D	19.82 $\mu\text{g/g}$
Fe	29.5 $\mu\text{g/g}$	2128.3 $\mu\text{g/g}$
Cu	20.73 $\mu\text{g/g}$	58.98 $\mu\text{g/g}$
Zn	3.55 $\mu\text{g/g}$	30.7 $\mu\text{g/g}$
Hg	N.D	N.D

Results and discussion:

Qualitative estimation of bioactive phytochemicals in *T.polium*:

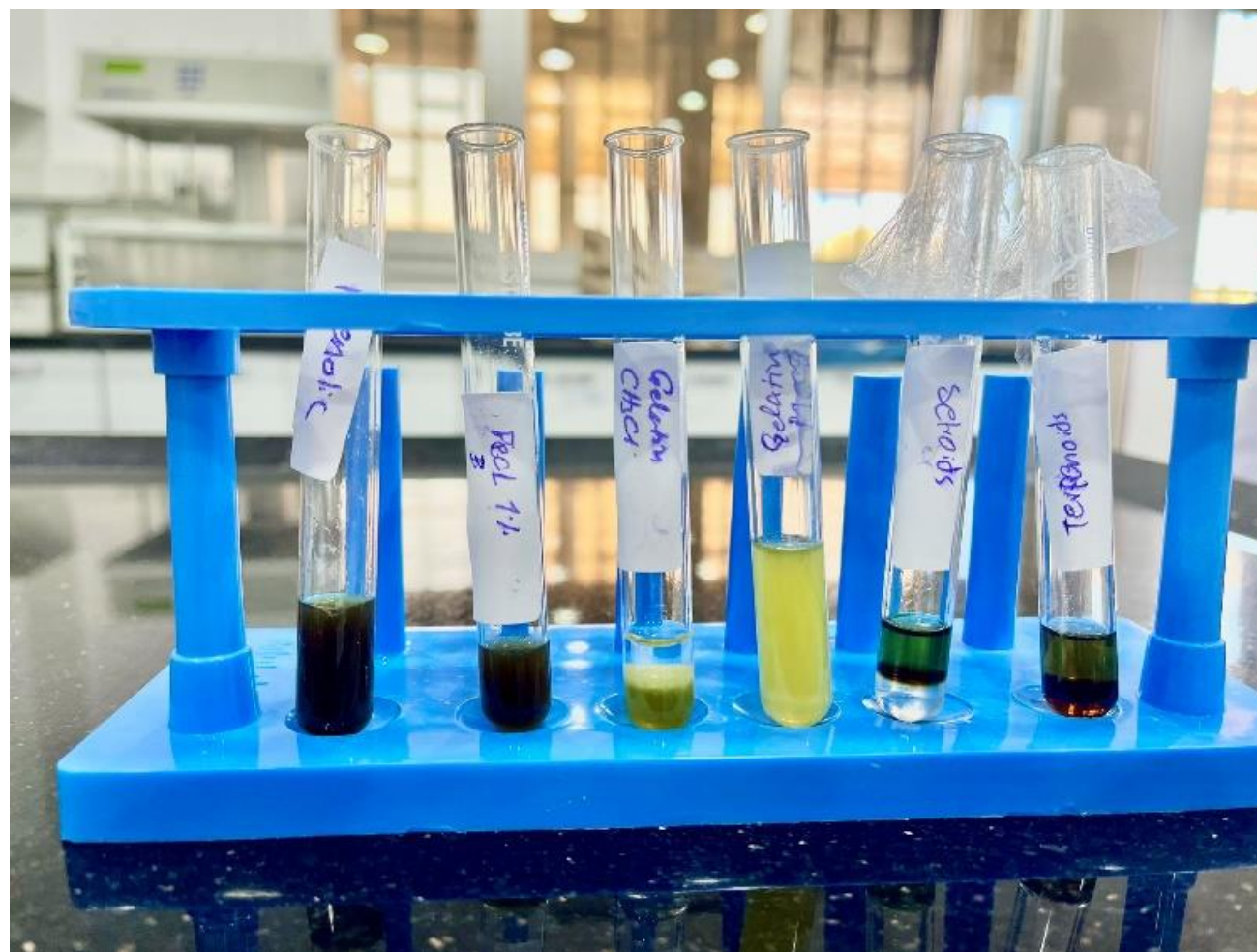
Table 2. Qualitative phytochemicals result in *T.polium*.

Phytochemical	Result
Tannin	++
Gelatin	++
Terpenoids	+++
Steroids	++
Phenolic	+++
Saponin	+

+: low quantity, ++: medium quantity, +++high quantity.

Results and discussion:

Qualitative estimation of bioactive phytochemicals in *T.polium*:



Conclusion:

- The concentration of heavy metals in *T.polium* tea was in the following order: **Fe>Ni>Cu>Zn>Cd**. In contrast, the concentration of heavy metals in *T.polium* acid-digested extract was in the following order: **Fe>Cu>Zn>Ni>Mn>Cd>Cr**.
- There are not enough studies about heavy metal concentrations in *T.polium* to increase the agreement of our findings.
- The study also demonstrated the phytochemical concentration in *T.polium* such as tannin, gelatine, terpenoids, steroids, phenolic, and saponin which is found in low amounts. In contrast, terpenoids and phenolics are found in higher concentrations.

Reference:

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