

Chemical Analysis and *In Vitro* Antioxidant Activity of *Taraxacum officinale* with Functional Food Implications

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INTRODUCTION & AIM

Medicinal plants have been utilized since ancient times in traditional medicine. These plants contain hundreds of chemical compounds that have been used for controlling insects, fungi, and diseases. Pharmaceutical research has relied on traditional plant knowledge to identify active medicinal plants, leading to the discovery of numerous beneficial compounds.

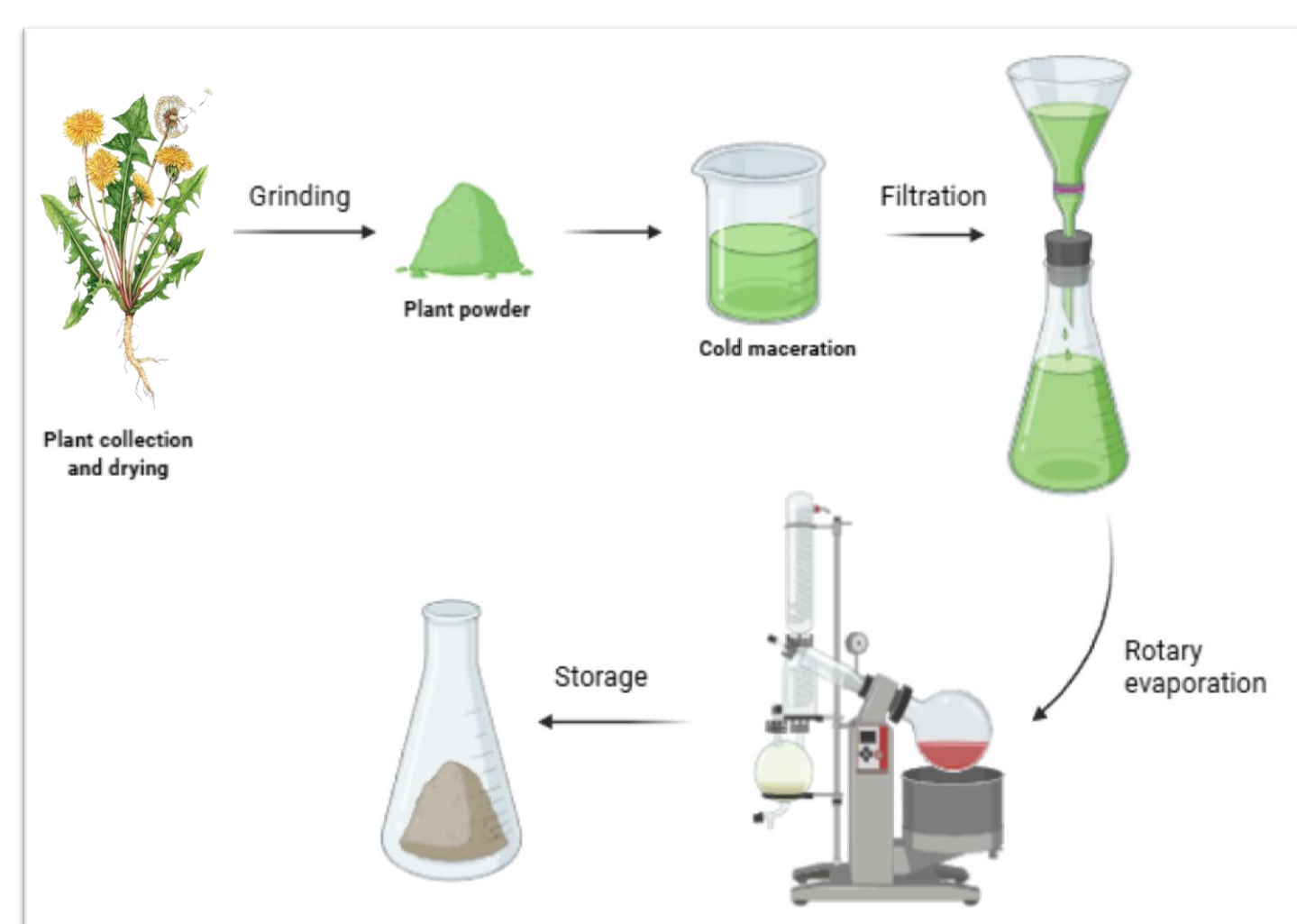
Each medicinal plant contains active substances in one or more of its parts, which may consist of a single compound or multiple substances. These active components exhibit physiological effects that contribute to disease treatment, whether in their pure extracted form or in their natural state—fresh, dried, or partially extracted.

The biological properties of medicinal plants must be thoroughly explored, identified, and documented to ensure their safe and effective use. Additionally, proper guidance is essential to promote their correct application (Al-Aghwani, 2024).

In this practical work, we will focus on dandelion (*Taraxacum officinale*) by evaluating its biological properties (antioxidant and antibacterial), and the determination of total phenolic, flavonoid, and tannin content.

Taraxacum officinale (common dandelion) is a perennial herb widely valued for its nutritional and medicinal properties having strong potential in food technology as a natural source of bioactive compounds. Its vitamin- and mineral-rich leaves, inulin- and antioxidant-containing roots, and flavonoid-rich flowers highlight its potential for use in functional beverages, dietary supplements, and natural food additives.

METHOD



Plant extraction

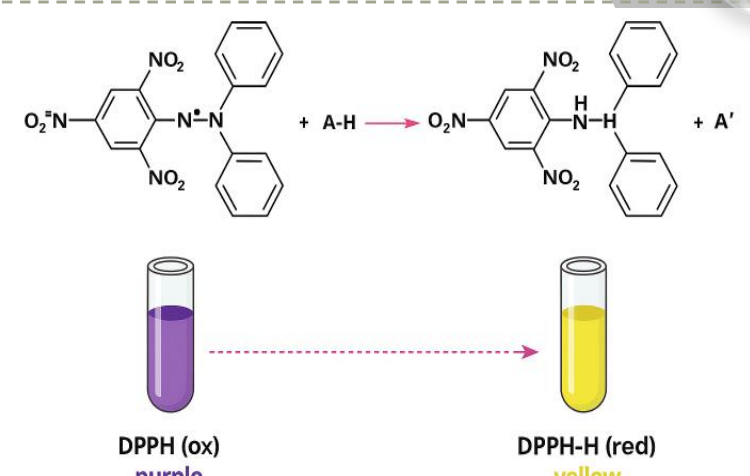
Quantitative analysis

- ✓ Total Phenolic contents,
- ✓ Total Flavonoids contents
- ✓ Total tanins contents
- ✓ Total Sugars contents

Anatomical study

- ✓ Plant Leaf & Stem Anatomy
- Double Coloration Method

DPPH anti-oxidant test



Antibacterial Activity

- ✓ Gram-negative *Escherichia coli*
- Pseudomonas aeruginosa*
- ✓ Gram-positive *Staphylococcus aureus*
- Bacillus subtilis*

Experimental Workflow for Chemical Composition, Anatomical Study, Antioxidant Capacity, and Antibacterial Activity

RESULTS & DISCUSSION

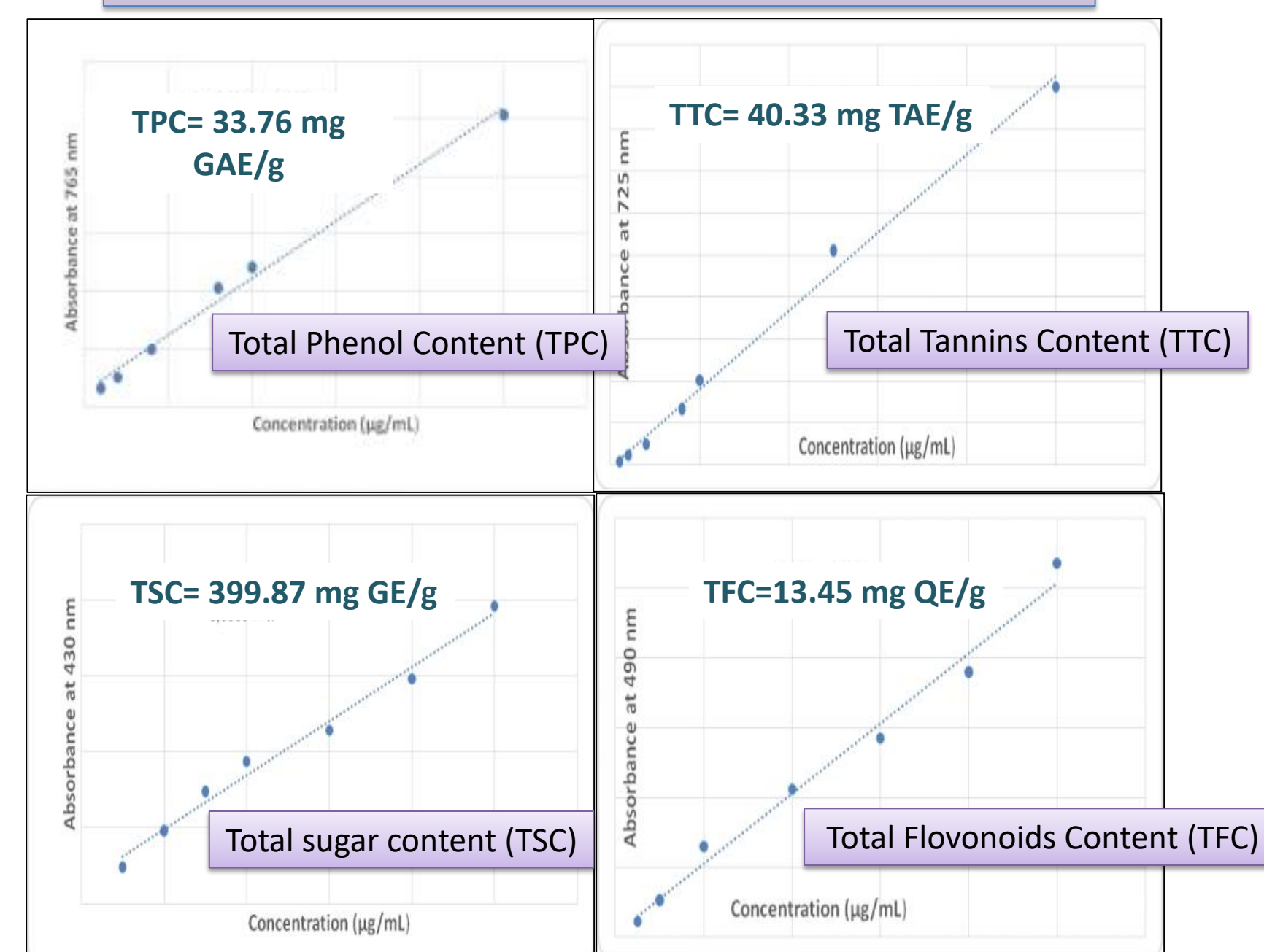
Plant Anatomy



Microscopic Observation of *Taraxacum officinale* Stem (Cross Section)

The dandelion stem has a layered structure: a protective epidermis, a supportive collenchyma band, a storage cortex of parenchyma, and a ring of vascular bundles (xylem inward, phloem outward) around a central pith of large parenchyma cells for storage and support.

Chemical Composition: Quantitative Analysis



DPPH test: IC₅₀ = 85,20 µg/ml

Table 2. Inhibition Zone Diameters (mm) of plant extracts and Standard antibiotics against tested bacteria.

Bacterial Strain	MTE	HTE	Gentamicin	Ampicillin
<i>Staphylococcus aureus</i>	9.6	10.3	27.0	36.5
<i>Pseudomonas aeruginosa</i>	9.3	8.9	22.0	0.0
<i>Bacillus subtilis</i>	9.7	9.2	25.5	34.0
<i>Escherichia coli</i>	9.0	8.5	28.0	32.0

MTE = Methanolic *Taraxacum officinale* extract, HTE = hexane *Taraxacum officinale* extract

The antibacterial activity of the tested plant extracts was generally weak, which places them in the resistant category.

CONCLUSION

Overall, *T. officinale* represents a promising candidate for the development of functional foods and nutraceuticals, particularly as a natural antioxidant source. Its incorporation into beverages, supplements, or as an additive could improve both the nutritional value and health-promoting properties of food products.

FUTURE WORK

Further research is needed to isolate specific active compounds, assess their safety and toxicity, and explore their mechanisms of action through in vivo studies