

ANTIOXIDANT ACTIVITY OF THE AQUEOUS EXTRACTS OF WILD THYME, DALMATIAN SAGE AND THEIR MIXTURE



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RESULTS

All tested extracts showed the ability to scavenge DPPH and NO radicals. The sage extract proved to be the best scavenger of DPPH radicals ($IC_{50} = 3.27 \mu\text{g/mL}$), while there was no significant difference in the ability to scavenge NO radicals ($IC_{50} = 63.38\text{--}66.81 \mu\text{g/mL}$). Compared to the Dalmatian sage extract, the wild thyme extract had a better ability to reduce and chelate iron ions, with IC_{50} values of $30.57 \mu\text{g/mL}$ and $375.05 \mu\text{g/mL}$, respectively.

INTRODUCTION

Medicinal and aromatic plants are known for their rich content of bioactive compounds, especially those with antioxidant properties. Wild thyme (*Thymus serpyllum* L.) and Dalmatian sage (*Salvia officinalis* L.) are known for their high polyphenol content. In our previous studies these plants, both individually and in a 3:1 mixture, showed the highest total polyphenol contents, indicating their potential for the development of functional beverages.

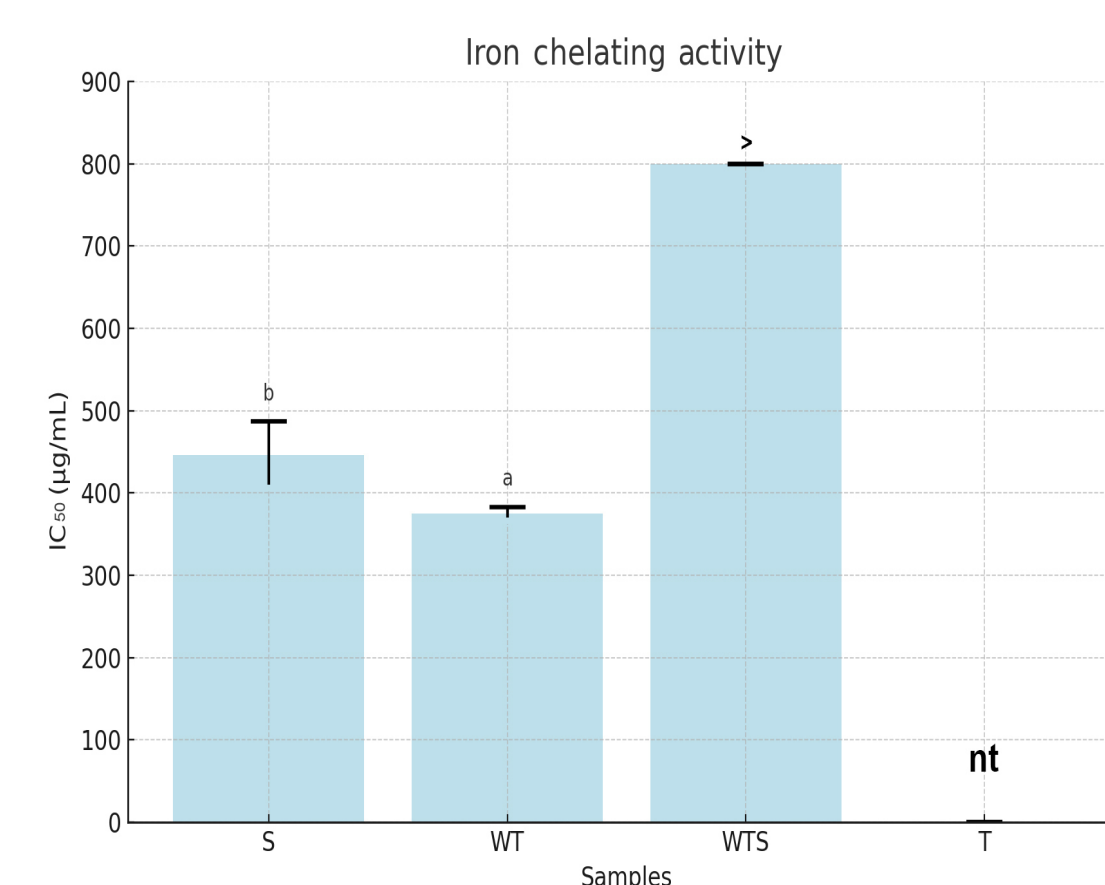
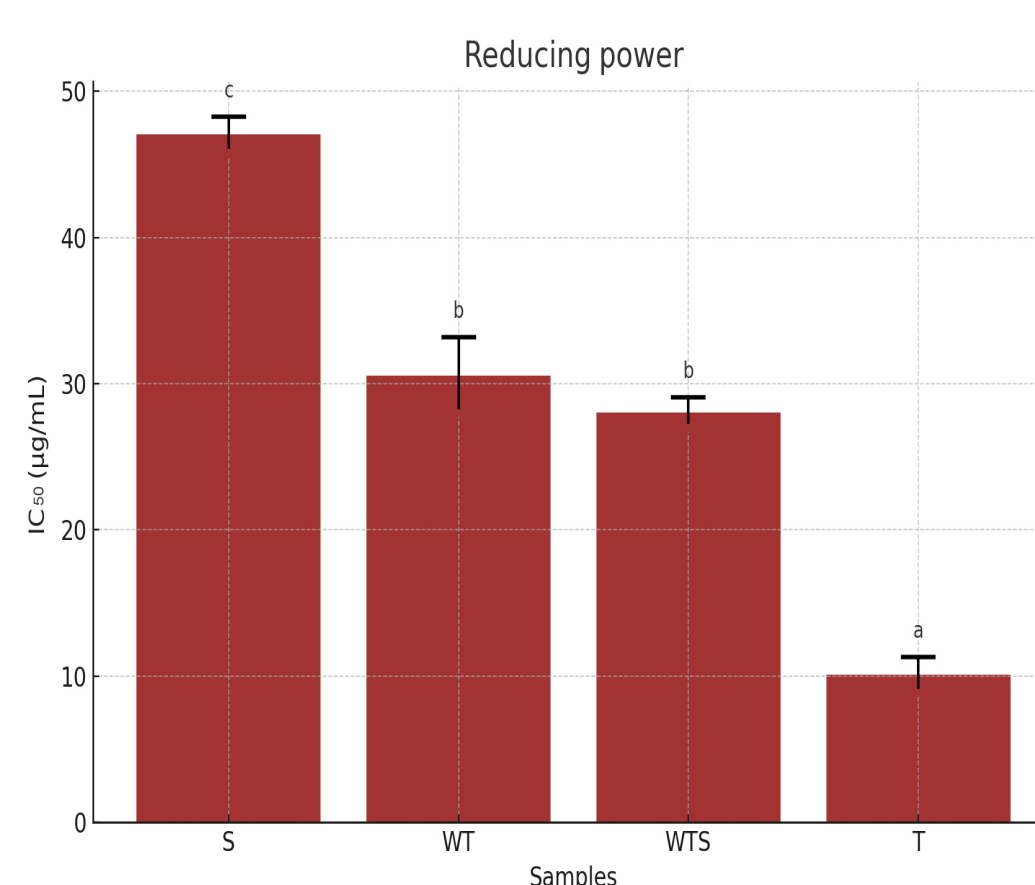
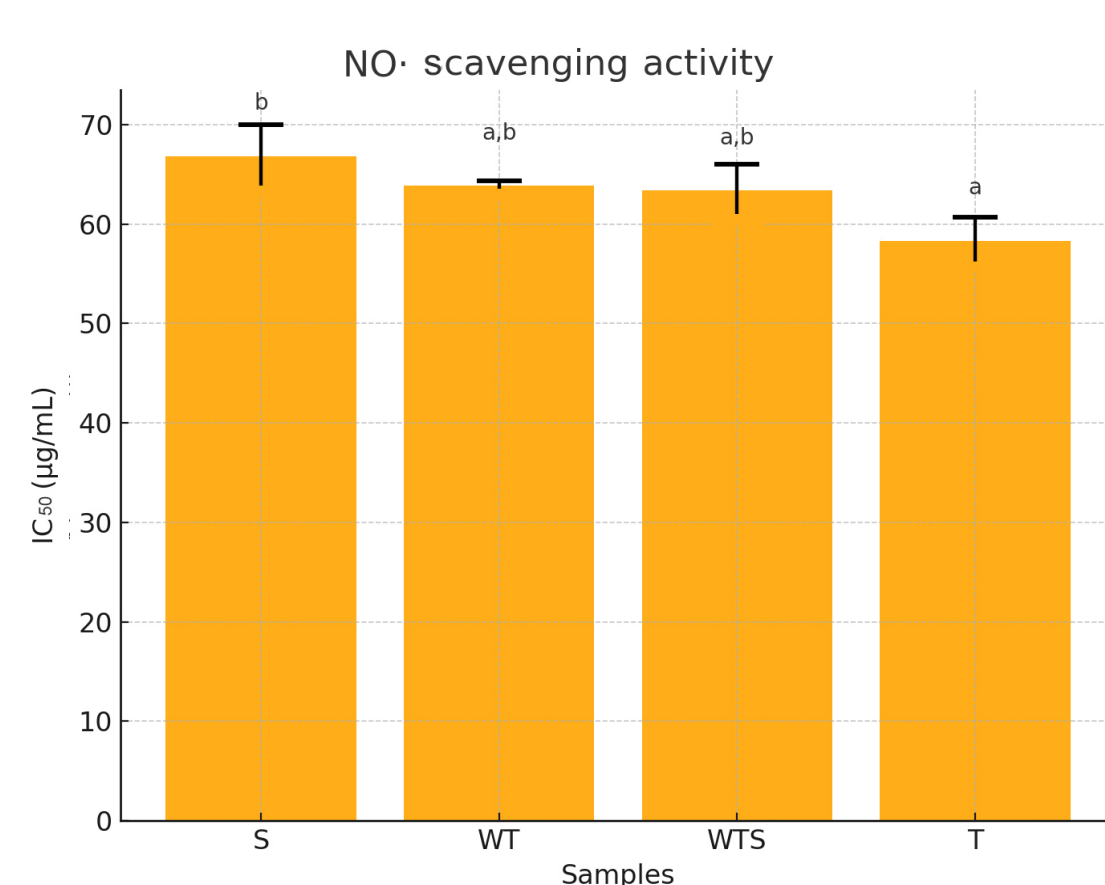
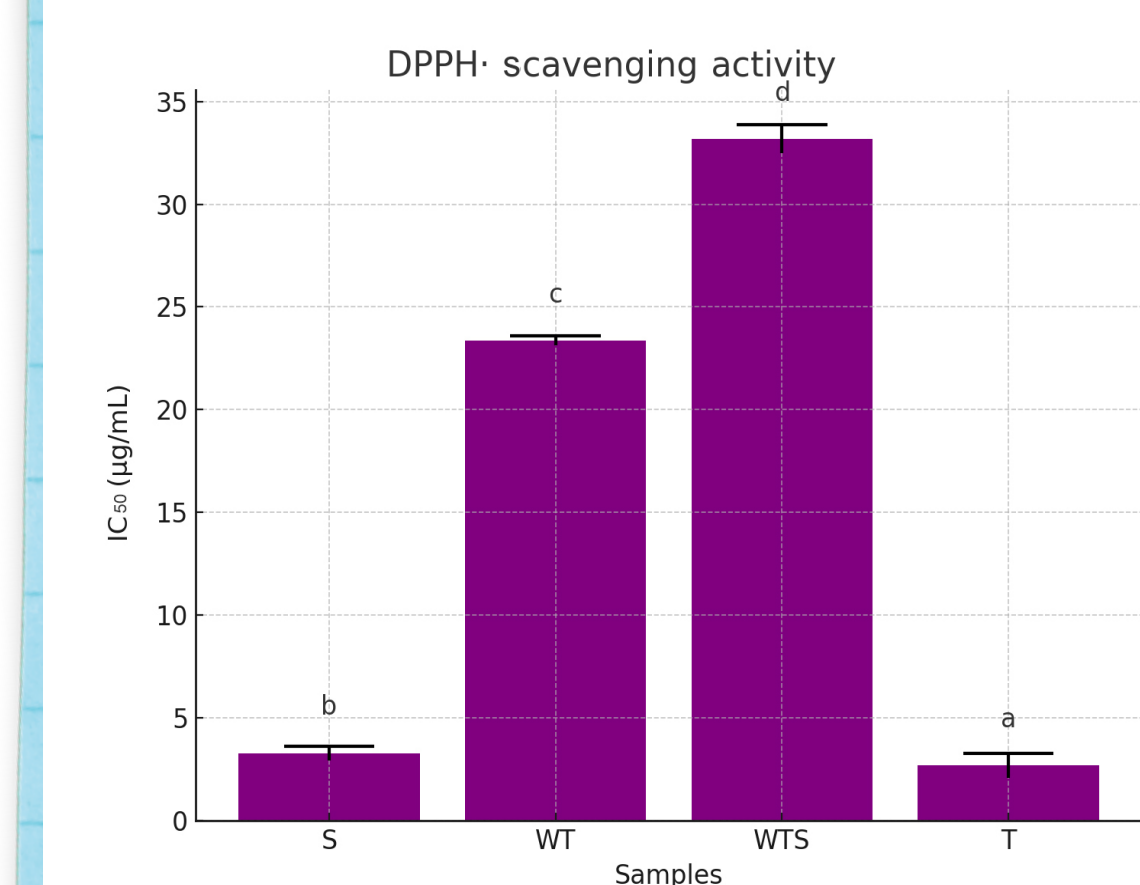
AIM OF THE STUDY

The aim of this study was to evaluate the antioxidant activity of freeze-dried aqueous extracts of wild thyme and Dalmatian sage and their mixture using different antioxidant assays.

METHODOLOGY

Using a horizontal water bath shaker, 30 g of ground dried aerial parts of wild thyme and Dalmatian sage leaves were extracted in 200 mL of distilled water at 60°C for 30 minutes. After filtration through Whatman no. 40 filter paper, the extracts were adjusted to a consistent volume. The extracts were then lyophilized using a Christ Alpha 2-4 LD plus freeze dryer for 72 hours at 0.008 mbar and -80°C . Freeze-dried aqueous extracts of wild thyme, Dalmatian sage, and their 3:1 mixture were tested at concentrations ranging from $1.56 \mu\text{g/mL}$ to $800 \mu\text{g/mL}$. Antioxidant activity was evaluated using four assays:

- DPPH radical scavenging assay** measures the ability of the extracts to neutralize DPPH radicals, with IC_{50} values calculated to indicate the concentration required to scavenge 50% of the radicals.
- NO radical scavenging assay** assesses the extracts' ability to scavenge nitric oxide radicals, with IC_{50} values calculated for 50% scavenging.
- Reducing power assay** evaluates the extracts' electron-donating ability, with IC_{50} values calculated based on the concentration giving an absorbance of 0.5.
- Iron chelation assay** measures the extracts' ability to chelate iron ions using ferrozine, with IC_{50} values indicating the concentration required to chelate 50% of the iron.



S – Dalmatian sage, WT – wild thyme, WTS – wild thyme/sage extract mixture (3:1, v/v), T – Trolox, nt – not tested. IC_{50} – concentration at which the extract exerts 50 % of its maximal effect. Each value is expressed as mean of three independent experiments \pm standard deviation, and different small letters indicate a statistically significant difference (Tukey's multiple comparisons test at 95% confidence level).

CONCLUSION

Our results show that the aqueous extracts of wild thyme and sage are potent antioxidants with a multitarget mechanism of action. The mixture of these extracts in a 3:1 ratio did not increase antioxidant properties, suggesting that their individual activities are not synergistically enhanced. These findings support the potential use of aqueous extracts of wild thyme and Dalmatian sage in the development of functional beverages and other antioxidant products.