

Sixth Article (Considered single- Common with another outside the specialization- Published)

Article title	<i>Response of growth, chemical composition, anatomical structure, antioxidant and antimicrobial activity of marjoram to yeast and methionine.</i>
Participants	Selim A. Khaled[*] , Ebtsam M. Abdella^{**} , Gamal F. Mohamed^{**} Food Science and Technology Department, Horticulture Departments, Agriculture Botany Department, Fayoum University
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Abstract

The obtained results indicated that foliar application of active dry yeast or methionine at any rate positively affected plant growth, oil production and plant chemical constituents. The best result was due to the interaction between active dry yeast of 4g/L and methionine at 100 ppm which increased stem section diameter, cortex thickness, vascular cylinder diameter and number of xylem vessels / cylinder in comparison with untreated plants. Among 32 compounds recorded the essential oil was found to be rich in terpinen-4-ol (23.2-29.3 %), cissabinene hydrate (15.6-21.0 %), trans-sabinene hydrate (7.47-12.9 %), and α -terpinene (4.81-7.53 %). The plants treated with 150 ppm methionine and 4g /L dry yeast recorded the highest terpinen-4-ol compound followed by plants treated with 150 ppm methionine and 6g/L dry yeast. The highest total phenolic contents were recorded for the plants treated with 100 ppm methionine and 4g /L dry yeast, while, the lowest total phenolic contents were recorded for the control. Free radical scavenging ability of the extracts was evaluated and the results indicated that the amounts of extracts required to scavenge 50% of DPPH (2-2 diphenyl-1-picrylhydrazle) radical (EC50) were ranged from 6.12 to 8.44 μ g extract / μ g DPPH, respectively. The results of antimicrobial activity indicated that the most susceptible organisms were *Escherichia coli*, and *Salmonella pullurum*, while *Staphylococcus aureus* being the least affected bacteria