



## WCCE11 - 11th WORLD CONGRESS OF CHEMICAL ENGINEERING

IACCHE - XXX INTERAMERICAN CONGRESS OF CHEMICAL ENGINEERING  
CAIQ2023 - XI ARGENTINIAN CONGRESS OF CHEMICAL ENGINEERING  
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Buenos Aires - Argentina - June 4-8, 2023

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### Antioxidant activity of clove and thyme essential oils over time

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Essential oils (EO) have been applied in food industry due to their many beneficial properties. EO have been shown to have useful properties for the food industry, including their antimicrobial activity and their eco-friendly origin [1]. In this work, the evolution of the antioxidant ability of clove and thyme EO was studied for one year, to understand the stability of different formulations under specific conditions. Clove and thyme EO coating solutions (with distinct formulations: 50ppm, 500ppm, 500 pm with 0.5% vinegar and 500ppm with 1% vinegar) were stored at -40 °C and their antioxidant capacity was determined using the DPPH radical method [2].

There is an increase in the antioxidant activity of the clove coatings between 0 and 6 months of storage, for almost all formulations. The 500ppm treatment always showed the highest antioxidant capacity. The highest antioxidant capacity was recorded at 500ppm with 1% vinegar, with no significant differences to the equivalent treatment without vinegar. Vinegar does not seem to significantly enhance the antioxidant activity of the clove EO.

All formulations with thyme EO showed a lower antioxidant activity when compared to the formulations with clove EO. In most cases, no significant differences in antioxidant activity were recorded over one year of coating preservation with thyme EO.

The coatings made with the clove EO have shown higher antioxidant capacity throughout the whole storage period, which means that this coating could be a good eco-friendly alternative to use in food preservation.

Clove EO

	50ppm	500ppm	50ppm + vinegar 0.5%	500ppm + vinegar 0.5%	50ppm + vinegar 1%	500ppm
0	18.32 ± 1.74 a	15.09 ± 4.91 a	52.42 ± 0.64 b	76.01 ± 3.82 a	53.71 ± 1.24 a	53.7
6	85.42 ± 3.03 b	95.21 ± 0.30 b	42.21 ± 5.65 a	89.50 ± 3.39 b	62.33 ± 9.27 ab	94.2
12	83.42 ± 0.31 b	94.47 ± 0.44 b	71.30 ± 0 c	92.98 ± 1.06 b	72.05 ± 0.37 b	95.1

Thyme EO

	50ppm	500ppm	50ppm + vinegar 0.5%	500ppm + vinegar 0.5%	50ppm + vinegar 1%	500ppm
0	12.14 ± 1.36 a	28.18 ± 3.12 a	45.75 ± 0.07 a	27.44 ± 0.79 a	44.68 ± 2.08 a	53.7
6	24.98 ± 0.77 b	35.59 ± 5.23 a	42.21 ± 5.65 a	63.72 ± 6.60 b	44.62 ± 1.31 a	70.3
12	38.88 ± 8.57 c	36.27 ± 1.24 a	39.50 ± 2.73 a	61.30 ± 5.28 b	70.250 ± 2.17 b	55.7

Work supported by the ICAPP project (POCI-01-0247-FEDER-072109), co-financed by FEDER through Compete 2020.

#### References:

1. Amorati, R., Foti, M.C., Valgimigli, L. (2013). Antioxidant Activity of Essential Oils. *J. Agric. Food Chem.* 61, 10835–10847.
2. Kim, M.J., Jun, J.G., Park, S.Y., Choi, M.J., Park, E., Kim, J.I., Kim, M.J. (2017). Antioxidant activities of fresh grape juices prepared using various household processing methods. *Food Sci. Biotechnol.* 26, 861–869.