# Effect of *Melissa officinalis* essential oil on biofilm formed by *Listeria monocytogenes* strains isolated from meat industries

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## Introduction

***Listeria monocytogenes*** is a foodborne pathogen associated with a low prevalence, but high hospitalization and mortality rate, thus being considered a global health issue. The ability to persist in different environments due to its biofilm forming capacities allows this bacterium to survive on surfaces for extended periods of time with little access to water and nutrients. **Essential oils** (EOs) have been considered as potential alternatives to conventional biocides and could be employed to counteract microbial biofilm in food processing environments.

**Aim:** This work aimed to evaluate the activity of ***Melissa officinalis*** essential oil against biofilm formed by different *L. monocytogenes* strains.

## Methodology

**Antimicrobial activity**

Minimum inhibitory concentration (MIC)

Inhibition of biofilm formation

Elimination of pre-established biofilms

- Broth microdilution method
- Crystal-violet assay
- MTT assay

## Results

The *M. officinalis* EO presented **MIC values** of 0.25 µL/mL and 0.5 µL/mL, with a minimum lethal concentration (**MLC**) of 1 µL/mL for all the *L. monocytogenes* strains.

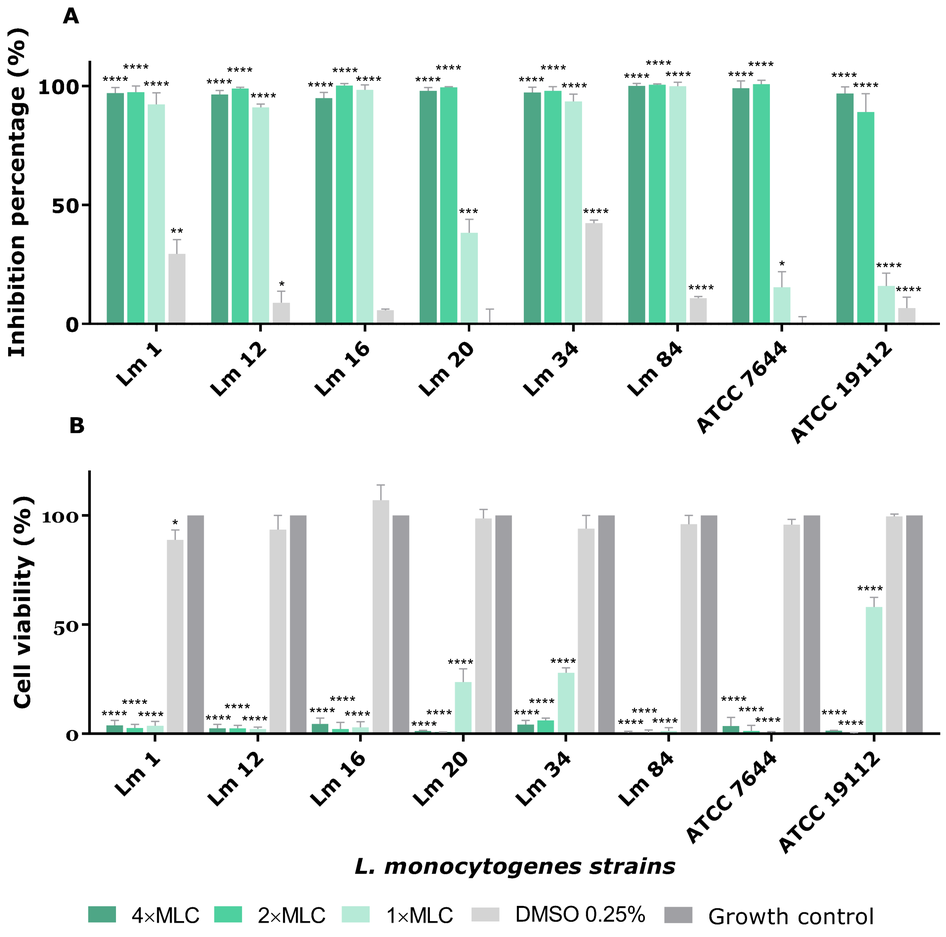


**Figure 1.** Effect of different concentrations of *M. officinalis* EO on the **formation of biofilm** by *L. monocytogenes* strains. The % of biofilm biomass inhibition was estimated by the crystal violet assay **(A)** and the metabolic activity was evaluated with the MTT assay **(B)**. *($p$<0.05); **($p$<0.01); ***($p$<0.001);**** ($p$<0.0001).

Inhibition of **biofilm formation** and elimination of **pre-established biofilm** was strongly evidenced by *M. officinalis* EO, in a concentration-dependent manner.

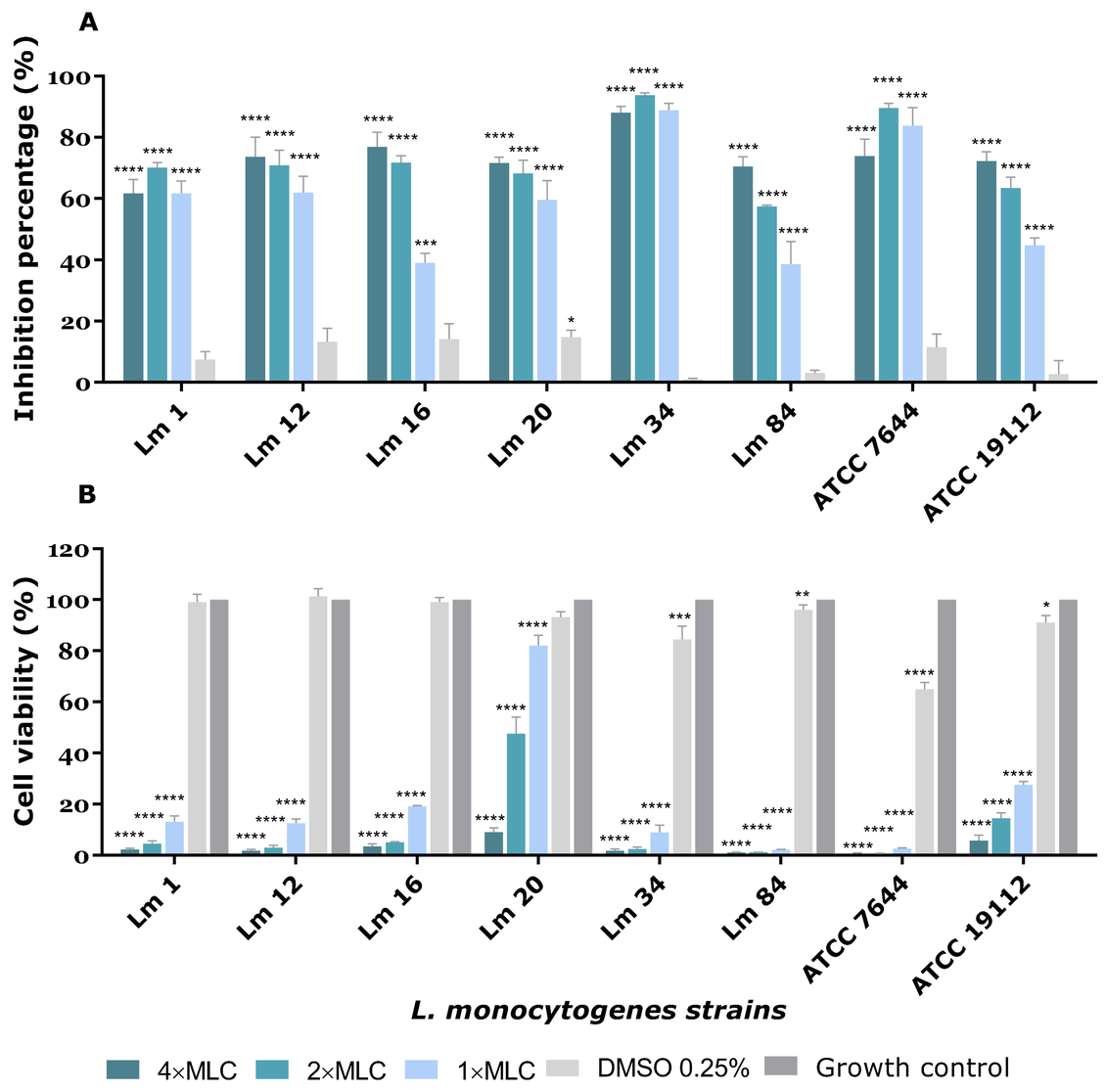


**Figure 2.** Effect of different concentrations of *M. officinalis* EO on the **elimination of pre-established biofilms** by *L. monocytogenes* strains. The % of biofilm biomass inhibition was estimated by the crystal violet assay **(A)** and the metabolic activity was evaluated with the MTT assay **(B)**. *($p$<0.05); **($p$<0.01); ***($p$<0.001); **** ($p$<0.0001).

## Conclusions

- ✓ The *M. officinalis* EO presented **antimicrobial activity** against *L. monocytogenes* strains isolated from meat processing industries and two reference strains;
- ✓ The *M. officinalis* EO inhibits the formation of biofilms by *L. monocytogenes* strains;
- ✓ The *M. officinalis* EO eliminate the preformed biofilm by *L. monocytogenes* strains.

## Acknowledgements

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