Accepted Manuscript

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PII: S0956-7135(13)00415-5

DOI: 10.1016/j.foodcont.2013.08.023

Reference: JFCO 3422

To appear in: *Food Control*

Received Date: 4 October 2012

Revised Date: 26 July 2013

Accepted Date: 20 August 2013

Please cite this article as: SzczepanskiS. & LipskiA., Essential oils show specific inhibiting effects on bacterial biofilm formation, *Food Control* (2013), doi: 10.1016/j.foodcont.2013.08.023.

Essential oils show specific inhibiting effects on bacterial biofilm formation

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Abstract

Essential oils are promising natural ingredients for the food industry due to their preservative and antimicrobial effects. We analyzed the inhibiting effects of thyme, oregano and cinnamon essential oil at sublethal concentrations on biofilm formation of three biofilm forming bacterial strains. These strains of the genera *Acinetobacter*, *Sphingomonas* and *Stenotrophomonas* were isolated from authentic biofilms in the food industry during a previous study.

Minimal inhibitory concentrations (MIC´s) for growth and biofilm forming activity were tested in a 96-well microtiter plate assay. For two out of three strains we found an inhibiting effect of essential oils on biofilm formation below the minimal inhibitory concentration (MIC) for growth of these strains. In contrast, for one strain inhibition of growth and inhibition of the biofilm formation by the essential oils are initiated at the same concentration.

Thyme oil was capable to inhibit the development of a biofilm at sublethal concentrations at 0.001 % (w/v). This oil seems to be a more efficient specific inhibitor compared with the other tested essential oils against the biofilm formation of all tested isolates. Controls showed that the detergent used, Tween 20, was not responsible for this effect.