THE ANTILISTERIAL ACTIVITY OF A GREEN TEA INFUSION *IN VITRO* AND ITS APPLICATION TO COLD-SMOKED SALMON

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BACKGROUND

- High occurrence of *Listeria monocytogenes* (LM) in cold-smoked salmon.
- Consumers demand for "natural alternatives" to synthetic chemicals.
- Antibacterial activity of green tea catechins (especially epigallocatechin gallate; EGCG) against Gram-positive bacteria.

OBJECTIVES

1. To determine the minimum inhibitory and the non-inhibitory concentration values (**MIC and NIC**) of a standardised green tea infusion on LM.
2. To evaluate the antilisterial activity of the green tea infusion **on cold-smoked salmon**.

MATERIAL AND METHODS

STEP 1: To **infuse dried green tea**, maximizing the yield of polyphenols (especially the antilisterial component EGCG)[1]. Then quantify its total polyphenol content.

STEP 2: To determine *in vitro* via **broth microdilution method**[2] the MIC and NIC of the green tea infusion and of its serial dilutions on LM using Bioscreen C, which measured the turbidity at 492 nm.

STEP 3: To conduct a ***challenge test***[3] on two prepared samples of cold-smoked salmon in order to compare and determine the potential use of green tea against the pathogen on this food matrix.

CONCLUSIONS

1. The green tea infusion that inhibits LM Scott A growth *in vitro* does not have any effect on it when applied to cold-smoked salmon, which might be due to its intrinsic properties (pH) and/or the interaction with some components.
2. The green tea infusion adding method to cold-smoked salmon does not change significantly its pH although it increases its a_w which enhances LM potential growth.

AND FURTHER RESEARCH

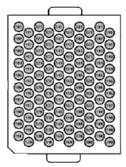
The antilisterial activity might be preserved when applied to an acidic way or to a more acidic food with less components prone to oxidation. Either way, sensory studies should be also conducted in case the green tea exhibited effects against LM.

RESULTS

STEP 1

Folin-Ciocalteu method[1] → Total polyphenolic content 6,65 $mgeq_{GAE}/ml$

STEP 2



Turbidity measurement of the column-filled *Honeycomb* wells every 15 min

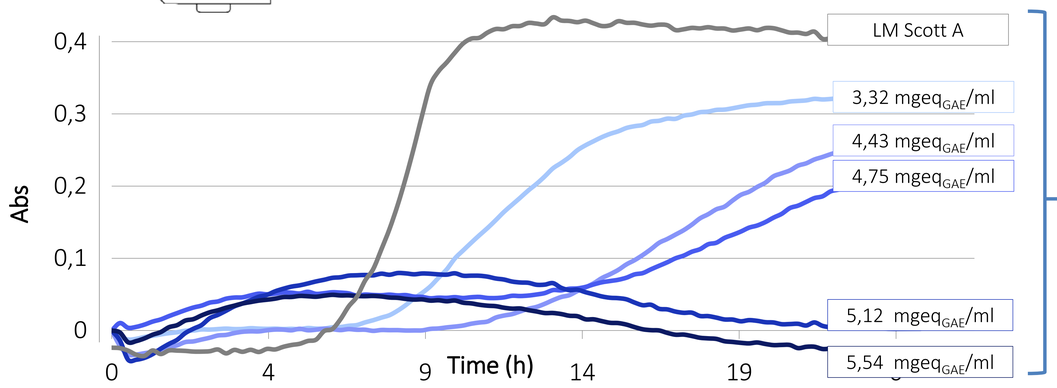


Figure 1: Growth curves of LM Scott A incubated at 37 °C - 24 h at different concentrations of polyphenols ($mgeq_{GAE}/ml$) and the positive control (LM Scott A) measured at 492 nm.

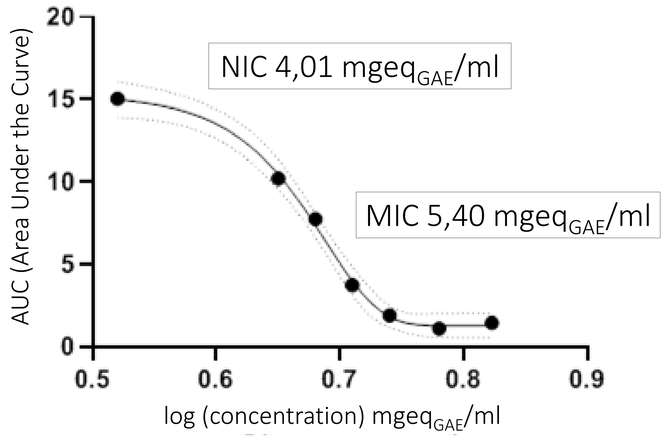
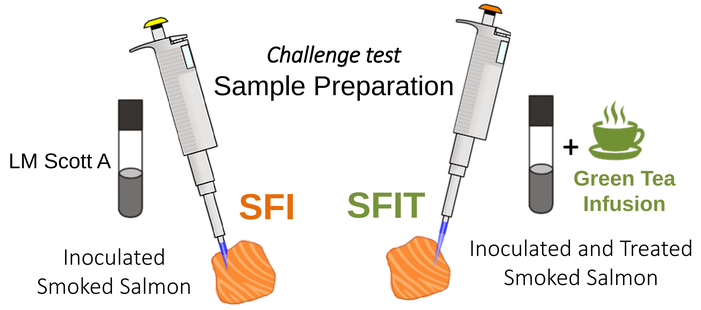


Figure 2[4,5]: The inhibition profile of the polyphenolic content ($mgeq_{GAE}/ml$) against LM Scott A, fitted using a modified Gompertz curve.

STEP 3



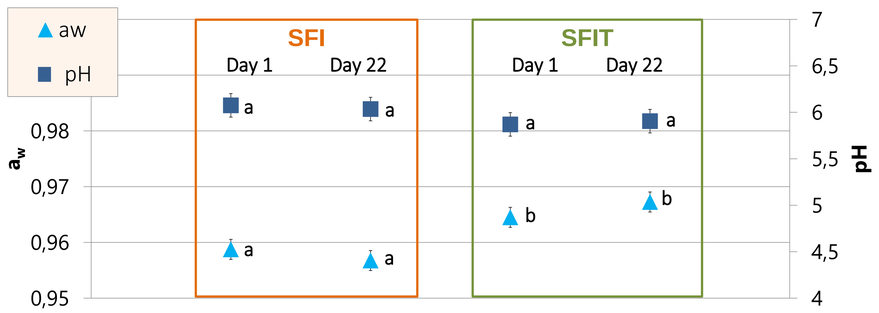


Figure 3: Intrinsic properties (pH and a_w) of **SFI** and **SFIT** the first and the last day of the *challenge test*[3]. Numbers followed by different letters are statistically different ($p < 0,05$) (Tukey's test).

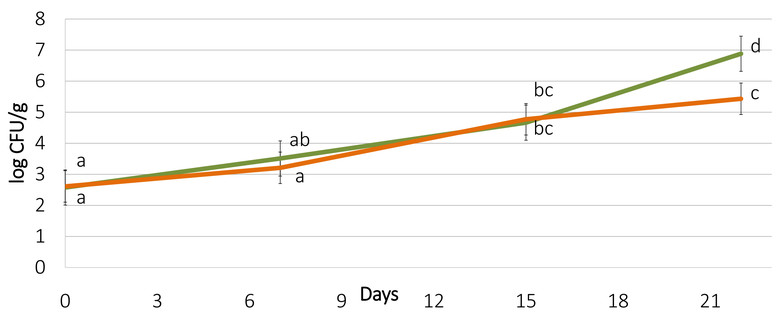


Figure 4: Counts of LM on the cold-smoked salmon samples **SFI** and **SFIT** stored at 8 °C during the *challenge test*[3].

DMFit

Table 1[3,6,7]: LM growth parameters of the two types of prepared cold-smoked salmon samples, **SFI** and **SFIT**.

Sample	Lag phase (days)	Max rate (log CFU/g/day)	Growth potential (log CFU/g)
SFI	$5,11^a \pm 2,90$	$0,22^a \pm 0,064$	$2,82^a$
SFIT	$6,55^a \pm 2,43$	$0,26^a \pm 0,045$	$4,31^b$

REFERENCES

[1]Bindes MMM, Cardoso LV, Reis MHM, Boffito CD. 2019. Maximisation of the polyphenols extraction yield from green tea leaves and sequential clarification. J Food Eng. 241:97–104. ‖ [2]CLSI. 2015. Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard—Tenth Edition. CLSI Doc M07- A10. 32(2). ‖ [3]Beaufort A, Bergis H, Lardeux A-L, Lombard B, Polet M, Botteldoorn N, Papageorgiou G, Andersen JK, Boel J, Hickey B, et al. 2014. TECHNICAL GUIDANCE DOCUMENT for conducting shelf-life studies on *Listeria monocytogenes* in ready-to-eat foods. Eur Union Ref Lab List monocytogenes.(Amendment 1 of 21 February 2019):1–47. ‖ [4]GraphPad ‖ [5]Lambert RJW, Pearson J. 2000. Susceptibility testing: accurate and reproducible minimum inhibitory concentration (MIC) and non-inhibitory concentration (NIC) values. Appl Microbiol. 88:784–790. ‖ [6]Combase DMFit ‖ [7] Baranyi J, Roberts TA,. 1994. A dynamic approach to predicting bacterial growth in food. Int J Food Microbiol. 23:277–294.