

The effects of oregano, ironwort and sage herbs on the growth of common foodborne pathogens

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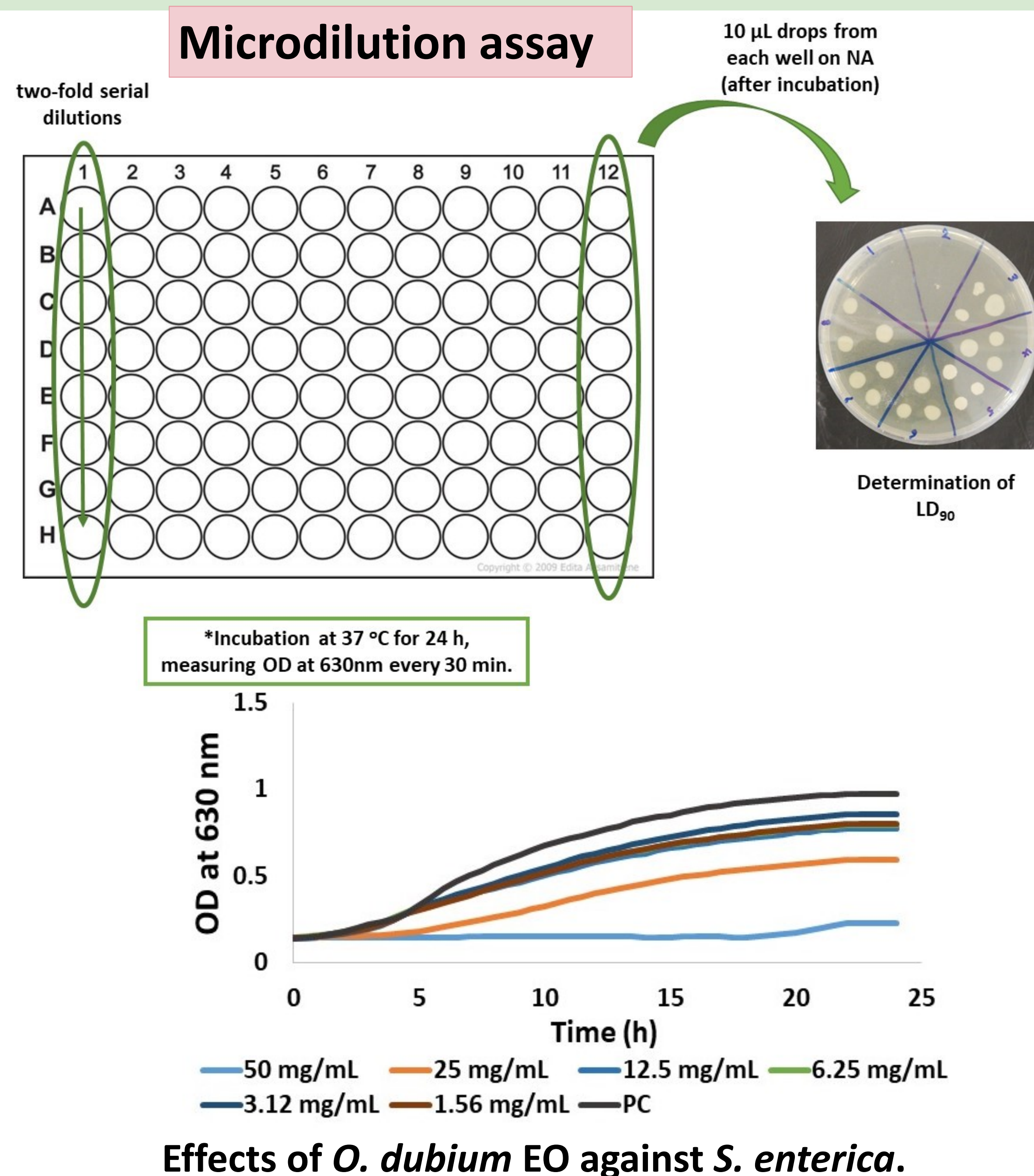
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Introduction

Listeria monocytogenes represents one of the most dangerous food-borne pathogens with higher death rates than other food-borne diseases and has been associated with the consumption of foods such as dairy products, raw vegetables, poultry, raw meats and fish. *Salmonella enterica* subsp. *enterica* has been previously isolated from commercially produced foodstuffs such as foods containing raw eggs. The aim of the present study was to assess the effects of the essential oil (EO) and hydrosol extracts of the aromatic herbs oregano (*Origanum dubium*), ironwort (*Sideritis cypria*) and sage (*Salvia fruticosa*) on the in vitro growth of the commercially provided *S. enterica* subsp. *enterica* (ATCC 51741) and *L. monocytogenes* (ATCC 19111).

Microdilution assay



	<i>S. enterica</i>		<i>L. monocytogenes</i>	
	MIC	LD ₉₀	MIC	LD ₉₀
<i>O. dubium</i> EO	1.56	12.5	12.5	50
<i>S. cypria</i> EO	25	50	12.5	25
<i>S. fruticosa</i> EO	12.5	50	1.56	100
<i>O. dubium</i> hydrosol	1.56	nd	12.5	50
<i>S. cypria</i> hydrosol	25	nd	50	nd
<i>S. fruticosa</i> hydrosol	3.12	nd	50	nd

* Results for EOs refer to mg/mL, while for hydrosols refer to % (v/v).

- *O. dubium* EO exhibited a significant inhibitory effect on *S. enterica* (MIC: 1.56 mg/mL and LD₉₀: 12.5 mg/mL).
- *S. fruticosa* EO exhibited a significant inhibitory effect on *L. monocytogenes* (MIC: 1.56 mg/mL and LD₉₀: 100 mg/mL).
- *O. dubium* hydrosol exhibited a stronger inhibitory effect on both bacteria compared to the hydrosols of *S. fruticosa* and *S. cypria*, with an MIC on *S. enterica* at 1.56% of dilution and an MIC at 12.5% of dilution on *L. monocytogenes*.

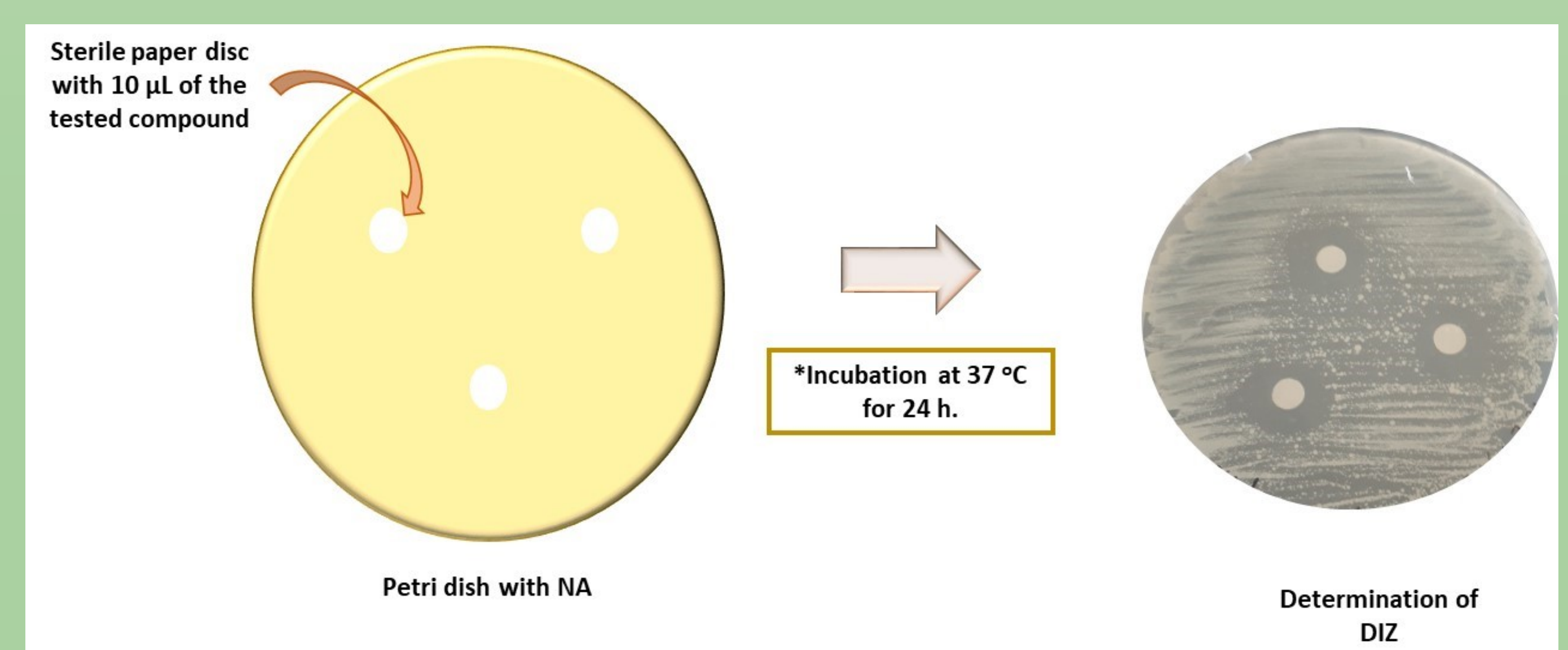
Disc diffusion assay

Effects of pure EOs and hydrosols

	<i>S. enterica</i>	<i>L. monocytogenes</i>
<i>O. dubium</i> EO	30	40
<i>S. cypria</i> EO	7.5	35
<i>S. fruticosa</i> EO	25	12
<i>O. dubium</i> hydrosol	6.5	6
<i>S. cypria</i> hydrosol	8	6
<i>S. fruticosa</i> hydrosol	6.5	6

* Results of DIZ refer to mm.

- Highlighted susceptibility of both tested bacteria to *O. dubium* EO
 - DIZ of 30 mm and 40 mm for *S. enterica* and *L. monocytogenes*, respectively.
- *S. fruticosa* EO presented the second highest activity against both bacteria.
- *L. monocytogenes* was more susceptible to the tested EOs and hydrosols.



Conclusions

The investigated aromatic herbs can serve as an inhibiting factor on the development of the studied pathogens, for the maintenance of shelf life of foodstuffs that could be at risk of being infected.

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