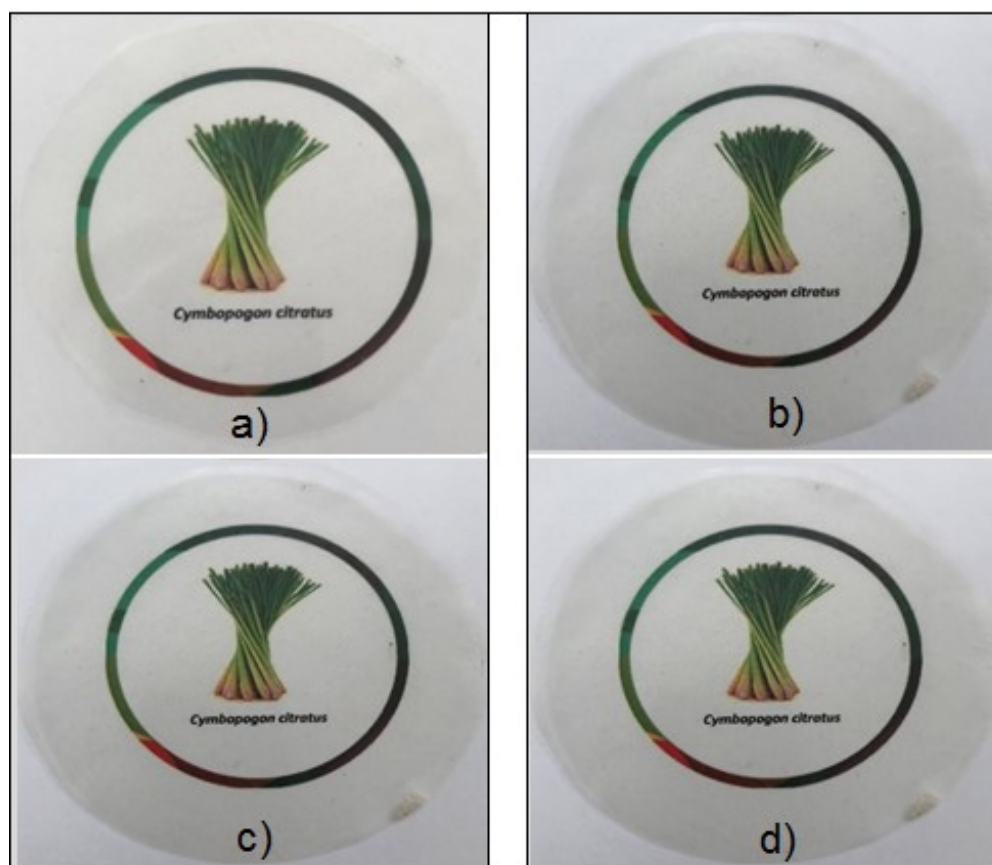
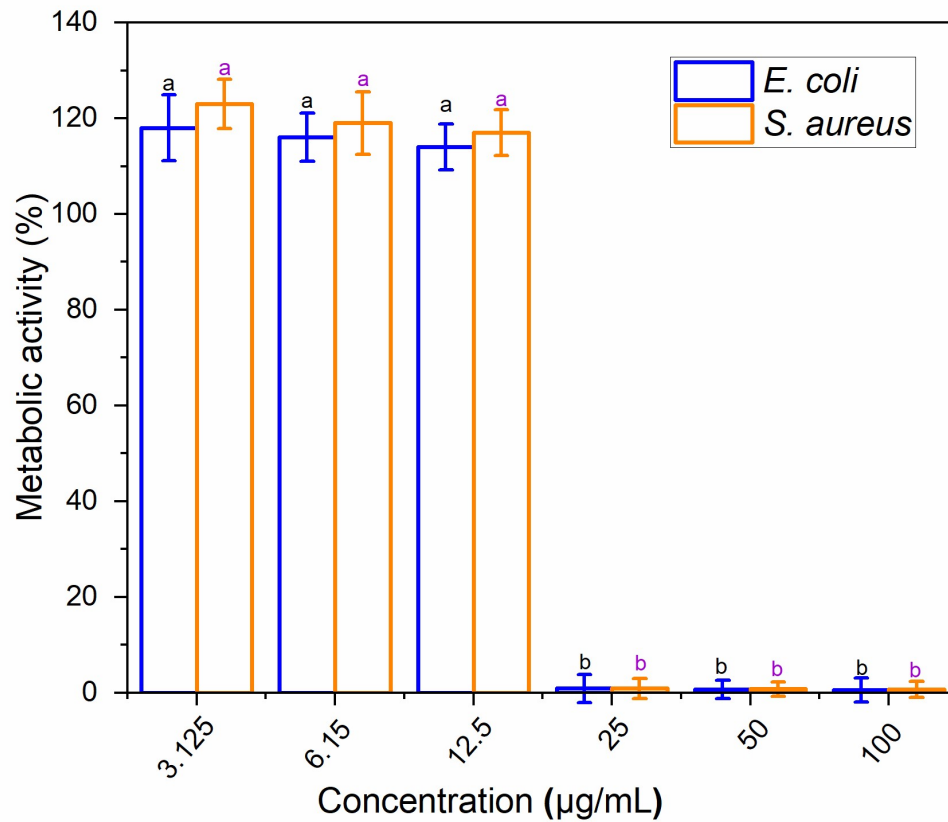


Supplementary Information

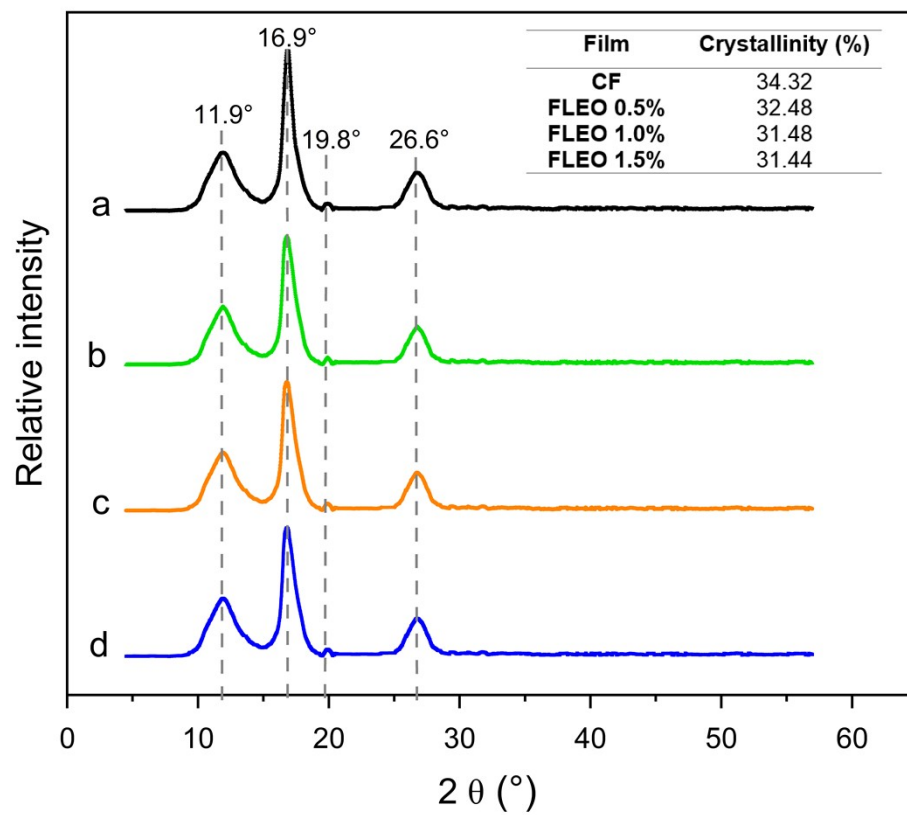


**Fig. 1.** Visual appearance of the films a) CF, b) FLEO-0.5%, c) FLEO-1.0%, d) FLEO-1.5%

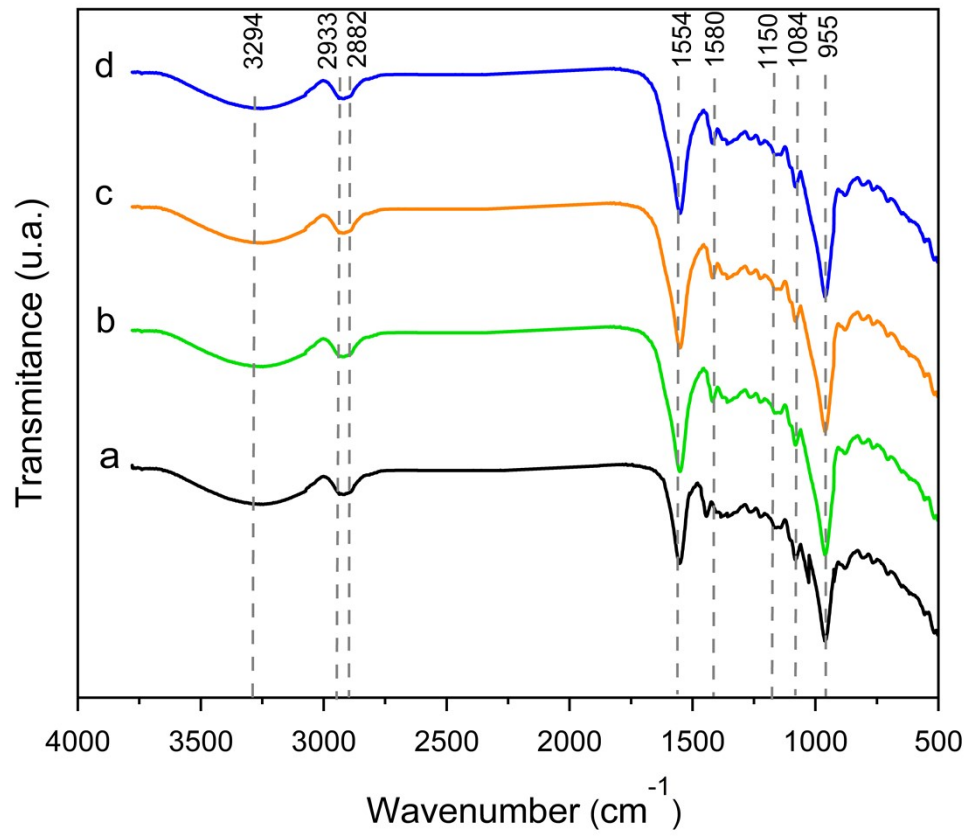


**Fig. 2.** Minimum inhibitory concentration (MIC) of lemongrass essential oil (LEO) at different concentrations (3.125 - 100 µg/mL) against *S. aureus* and *E. coli*. Data shown represent mean ± standard deviation. Different letters on the bars indicate significant differences between groups ( $p < 0.05$ ) based on ANOVA followed by Tukey test.

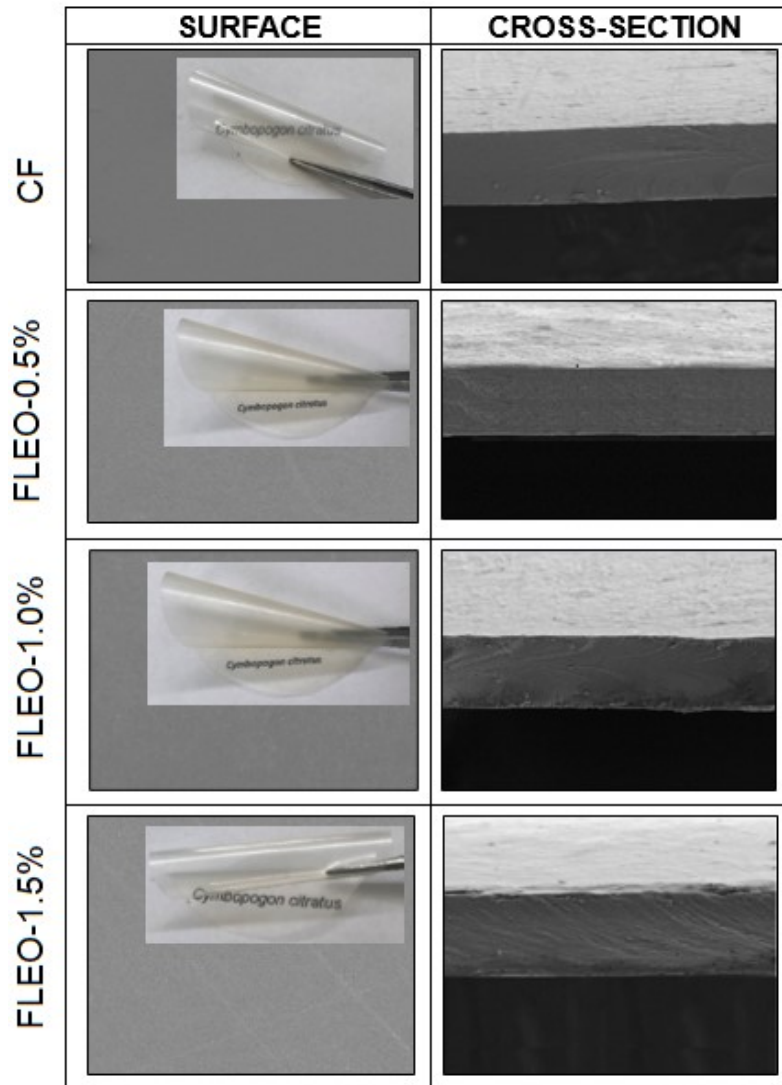
The MIC values obtained for LEO against *S. aureus*



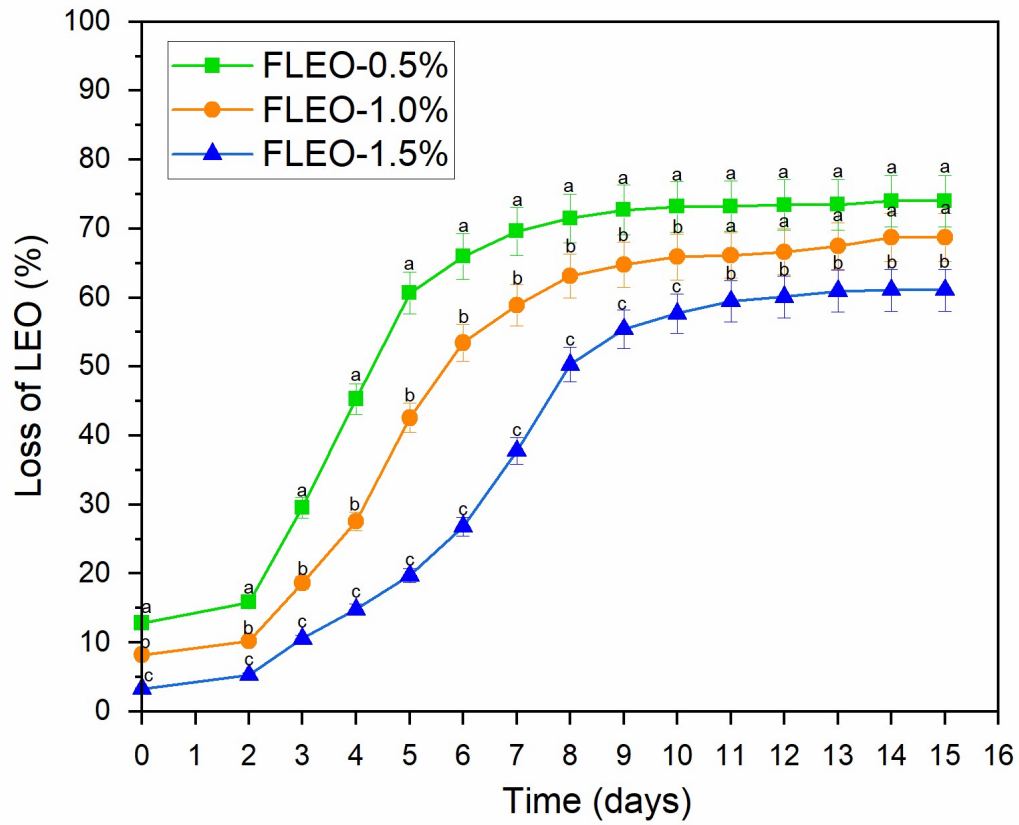
**Fig. 3.** XRD patterns of the films a) CF b) FLEO-0.5%, c) FLEO-1.0% and d) FLEO-1.5%.



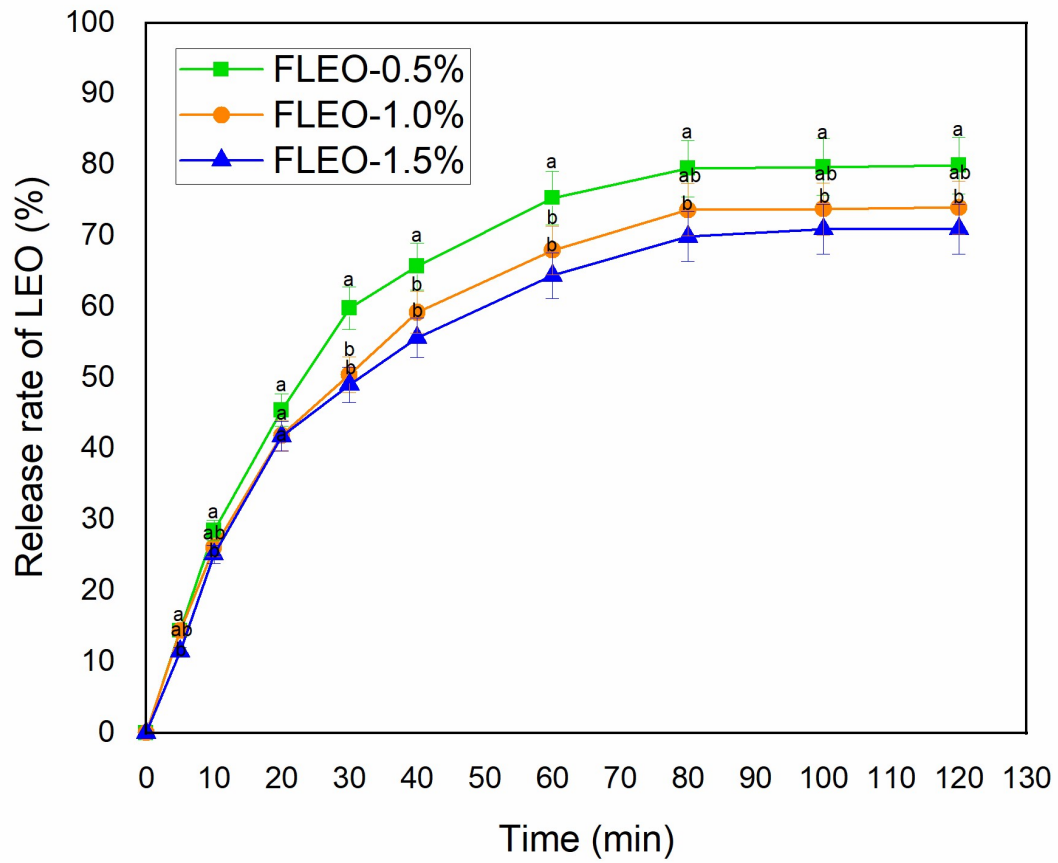
**Fig. 4.** FTIR spectra of the films a) CF, b) FLEO-0.5%, c) FLEO-1.0 and, d) FLEO-1.5%.



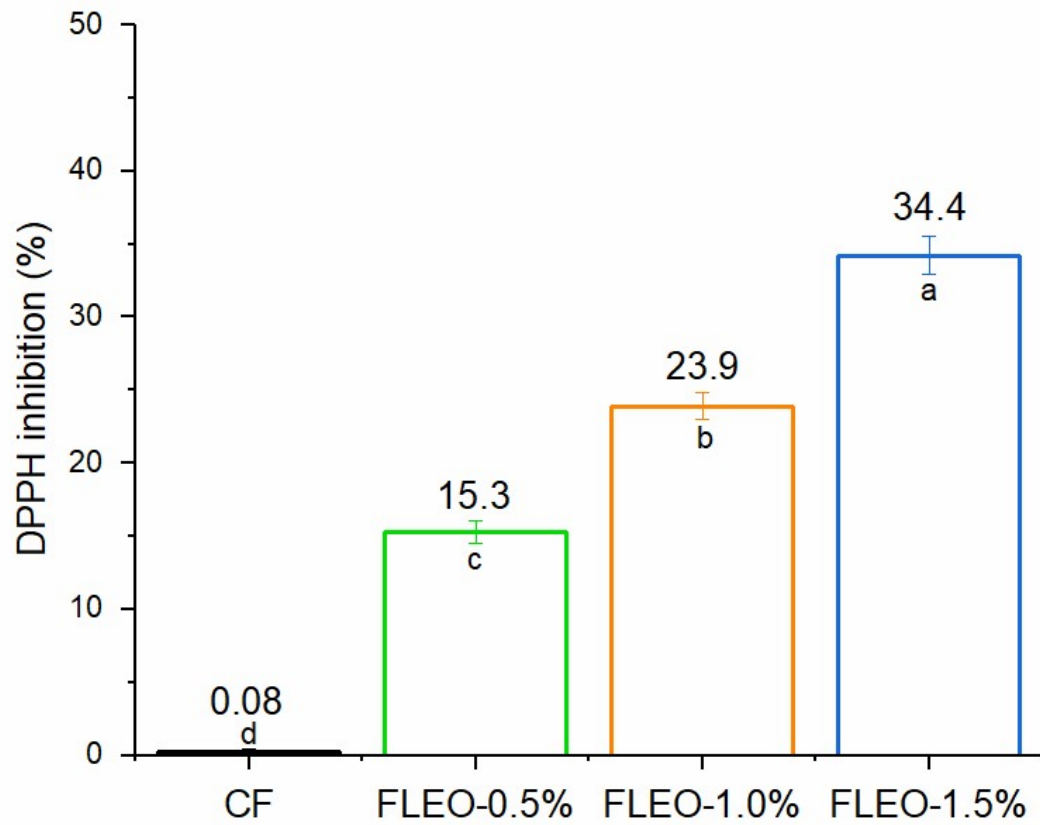
**Fig. 5.** SEM images of the surface (left column) and the cross-sections (right column) of the film CF, FLEO-0.5%, FLEO-1.0% and FLEO-1.5%.



**Fig. 6.** Loss of lemongrass essential oil (LEO) from the films a) FLEO-0.5%, b) FLEO-1.0% and c) FLEO-1.5%. Different letters on the bars indicate significant differences between treatments ( $p < 0.05$ ).



**Fig. 7.** Release profile of lemongrass essential oil (LEO) from the films a) FLEO-0.5%, b) FLEO-1.0% and c) FLEO-1.5%. Different letters on the bars indicate significant differences between treatments ( $p < 0.05$ ).



**Fig. 8.** DPPH inhibition activity of the films containing or not different concentrations of lemongrass essential oil (LEO). Different letters on the bars indicate significant differences between treatments ( $p < 0.05$ ).



**Table 1.** Compounds identified of lemongrass essential oil (LEO)

Compound	Retention time (min)	Relative content (%)			
5-Hepten-2-one, 6-methyl-	5.29	0.94	cis-2,6-Dimethyl-2,6-octadiene	16.82	0.71
$\alpha$ -Sabinene	5.42	0.10	Geranyl Acetate	17.71	2.30
$\beta$ -Myrcene	5.62	0.25	Trans-Nerolidol	18.03	0.08
1S- $\alpha$ -Pinene	6.10	0.22	(-)- $\beta$ -Elemene	18.26	0.38
Limonene	6.50	2.79	Caryphyllene	19.15	2.83
(E)- $\beta$ -Ocimene	6.57	0.49	4,7,10-Cycloundecatriene, 1,1,4,8-tetramethyl-, cis, cics, cis-	19.99	0.36
(Z)- $\beta$ -Ocimene	6.81	0.26	Germacrene D	20.76	0.44
Phenol, m-tert-butyl-	8.34	0.08	$\alpha$ -Muurolene	21.33	0.14
Linalool	8.06	0.67	$\gamma$ -Muurolene	21.74	0.21
Cis-rose oxide	8.34	0.09	$\delta$ -Cadinene	22.06	0.70
Cyclohexene, 3,3,5-trimethyl-	8.99	0.13	$\alpha$ -Elemol	22.84	0.64
1,4-Hexadiene, 3,3,5-trimethyl-	9.29	0.38	1-Hydroxy-1,7-dimethyl-4-isopropyl-2,7-cyclodecadiene	23.95	0.71
(R)-(+)-Citronellal	9.68	4.74	Caryophyllene oxide	24.06	0.62
3-Decyne	9.98	1.40	3-Octyne, 7-methyl-	25.02	0.10
Imidazole, 5-[N(2)-(isopropylidene)carbohydrano]-	10.33	0.06	$\gamma$ -Eudesmol	26.19	0.07
Cyclohexanone, 5-methyl-2-(1-methylethenyl)-, trans	10.63	1.86	$\tau$ -Muurolol	26.61	0.43
1, 11-Dodecadiene	10.91	0.02	$\beta$ -Eusdemol	26.90	0.05
Decanal	11.50	0.26	$\alpha$ -Cadinol	27.16	0.55
(R)-(+)- $\beta$ -Citronellol	13.40	34.47	7-Octen-1-ol, 2,6-dimethyl-	34.04	0.07
Citral	14.71	39.12	1,5,9-Decatriene. 2,3,5,8-tetramethyl-	37.83	0.04
			Neoisolongifolene, 8-bromo-	41.47	0.06
			Total		99.82

**Table 2.** Thickness and mechanical properties of the films containing or not different concentrations of lemongrass oil essential (LEO).

<b>Film</b>	<b>Thickness (mm)</b>	<b>TS (MPa)</b>	<b>EB (%)</b>
<b>CF</b>	0.107±0.03 <sup>a</sup>	2.15±0.57 <sup>a</sup>	14.08±1.57 <sup>a</sup>
<b>FLEO 0.5%</b>	0.095±0.01 <sup>a</sup>	1.49±0.43 <sup>b</sup>	11.85±1.18 <sup>b</sup>
<b>FLEO 1.0%</b>	0.090±0.02 <sup>a</sup>	1.35±0.09 <sup>c</sup>	10.78±1.26 <sup>b</sup>
<b>FLEO 1.5%</b>	0.107±0.03 <sup>a</sup>	1.31±0.60 <sup>d</sup>	10.57±1.05 <sup>b</sup>

Data reported are mean values ± standard deviation.

Median on the same column with different letters are significantly different (Tukey:  $p < 0.05$ ).

**Table 3.** Water vapour permeability (WVP), moisture content and solubility of the films containing or not different concentrations of lemongrass oil essential (LEO).

<b>Film</b>	<b>WVP (x 10<sup>-9</sup> g s<sup>-1</sup>m<sup>-1</sup>Pa<sup>-1</sup>)</b>	<b>Moisture Content (%)</b>	<b>Solubility (%)</b>
<b>CF</b>	7.81±0.52 <sup>a</sup>	20.34±0.50 <sup>a</sup>	85.05±0.91 <sup>a</sup>
<b>FLEO 0.5%</b>	6.92±0.38 <sup>b</sup>	18.41±0.33 <sup>b</sup>	78.72±0.78 <sup>b</sup>
<b>FLEO 1.0%</b>	6.87±0.25 <sup>b</sup>	17.95±0.40 <sup>c</sup>	73.30±1.32 <sup>c</sup>
<b>FLEO 1.5%</b>	6.84±0.30 <sup>b</sup>	17.76±0.20 <sup>c</sup>	69.34±1.23 <sup>d</sup>

Data reported are mean values ± standard deviation.

Median on the same column with different letters are significantly different (Tukey: p < 0.05).

**Table 4.** CIELAB colour parameters and opacity of the films containing or not different concentrations of lemongrass oil essential (LEO).

<b>Film</b>	<b>L*</b>	<b>a*</b>	<b>b*</b>	<b>Opacity (%)</b>
<b>CF</b>	56.77±0.06 <sup>a</sup>	1.10±0.10 <sup>a</sup>	16.37±0.12 <sup>a</sup>	78.37±0.60 <sup>a</sup>
<b>FLEO 0.5%</b>	55.63±0.11 <sup>b</sup>	1.09±0.08 <sup>a</sup>	16.53±0.10 <sup>b</sup>	78.12±0.16 <sup>a</sup>
<b>FLEO 1.0%</b>	55.57±0.15 <sup>b</sup>	1.10±0.00 <sup>a</sup>	16.60±0.16 <sup>b</sup>	79.01±1.00 <sup>b</sup>
<b>FLEO 1.5%</b>	55.20±0.17 <sup>c</sup>	1.10±0.06 <sup>a</sup>	17.17±0.23 <sup>c</sup>	79.59±0.93 <sup>b</sup>

Data reported are mean values ± standard deviation.

Median on the same column with different letters are significantly different (Tukey:  $p < 0.05$ ).

**Table 5.** Antibacterial activity of the films containing or not different concentrations of lemongrass essential oil (LEO) against *S. aureus*. and *E. coli*.

Film	Inhibition zone (mm)	
	<i>S. aureus</i>	<i>E. coli</i>
CF	0.0 <sup>a</sup>	0.0 <sup>a</sup>
FLEO 0.5%	15.92±1.03 <sup>b</sup>	13.96±0.98 <sup>b</sup>
FLEO 1.0%	17.13±1.09 <sup>c</sup>	14.10±1.12 <sup>b</sup>
FLEO 1.5%	19.24±1.18 <sup>d</sup>	16.06±1.27 <sup>c</sup>

Data reported are mean values ± standard deviation.

Median on the same column with different letters are significantly different (Tukey:  $p < 0.05$ ).