



**GHENT
UNIVERSITY**

Essential oils against vibriosis in crustacean cultures

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INTRODUCTION



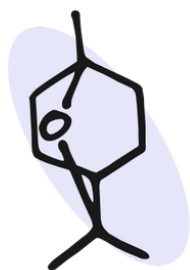
(E)- β -ocimene



(Z)- β -ocimene



Terpinen-4-ol



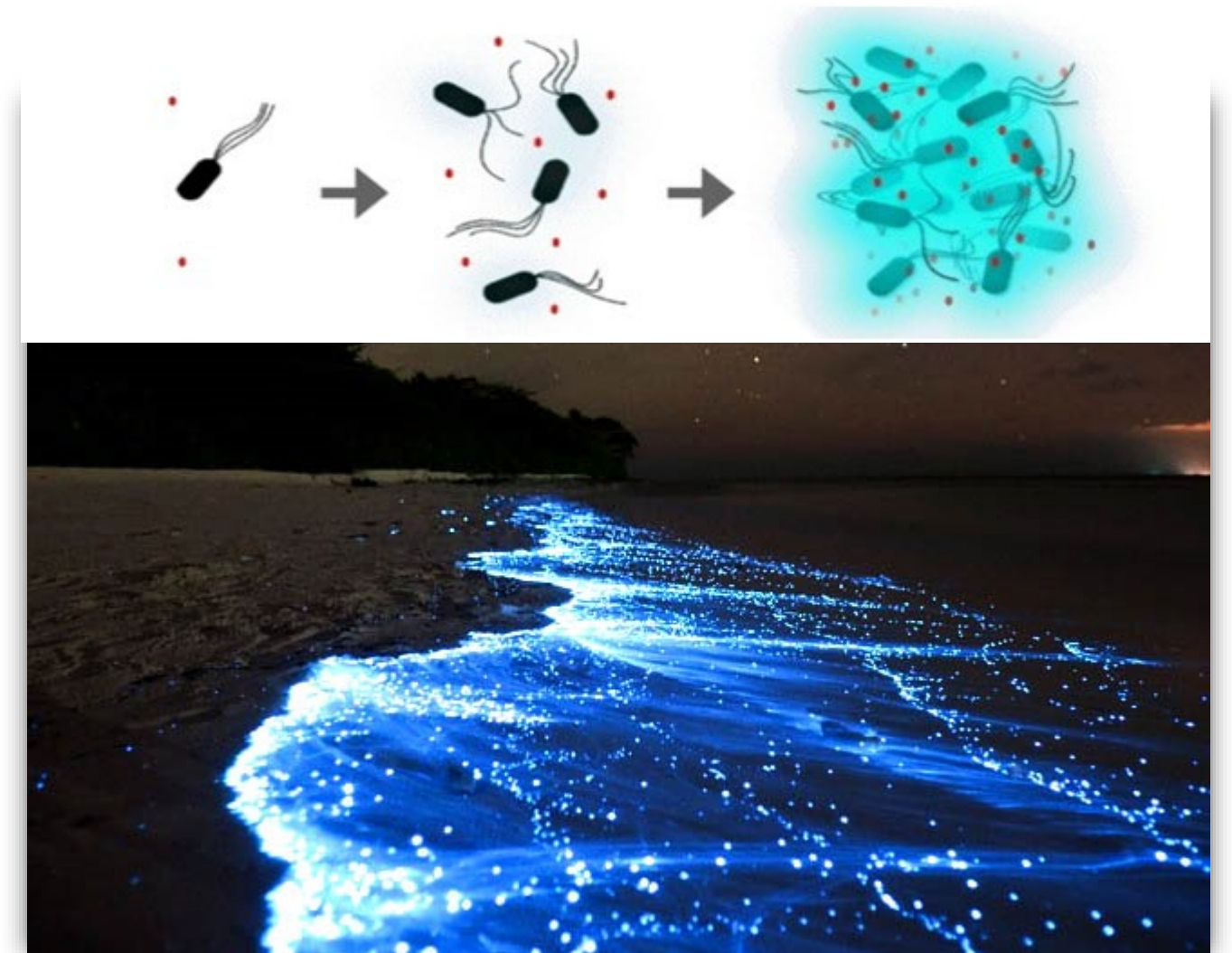
1,8-Cineole



Camphor

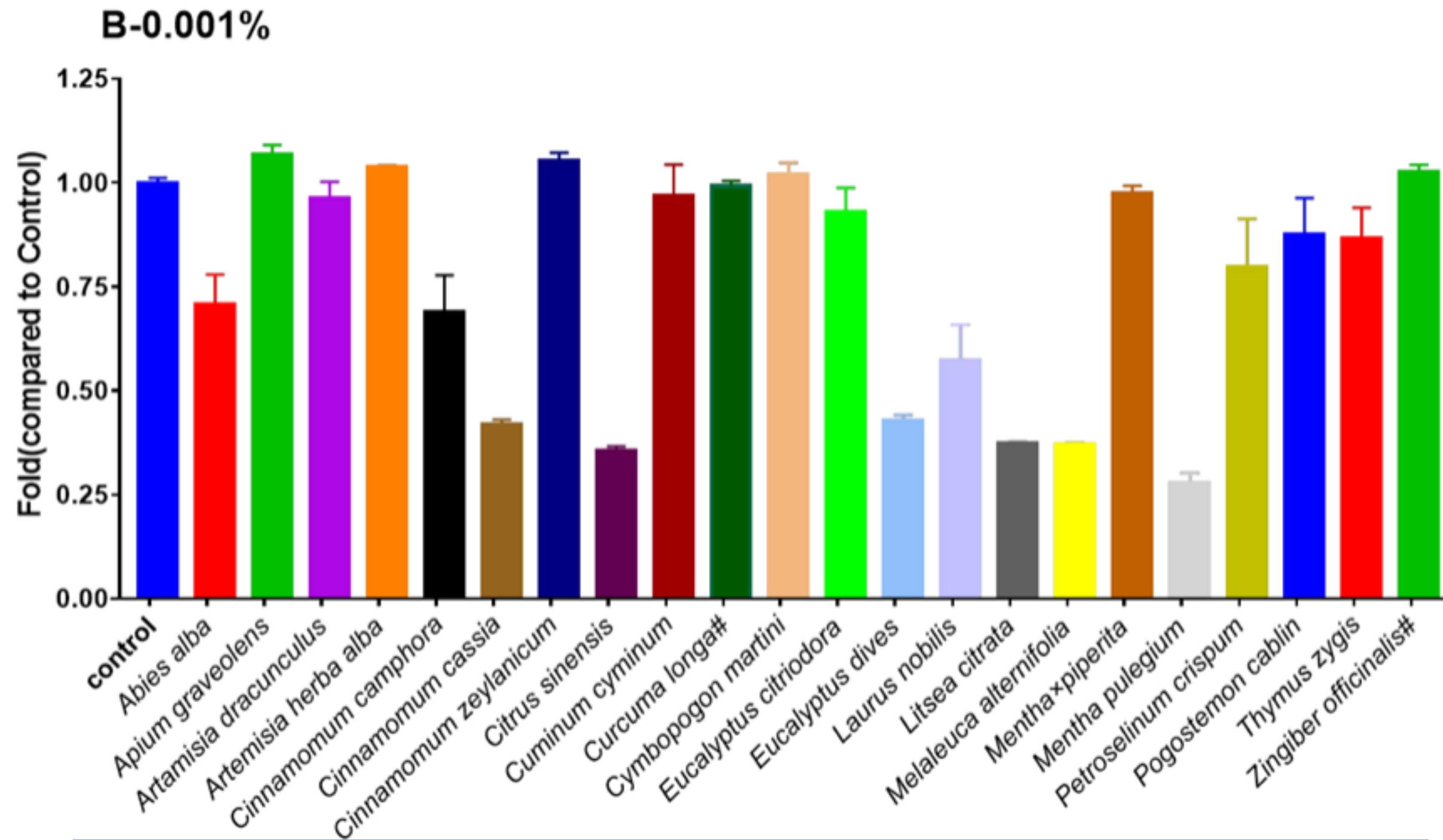


Limonene

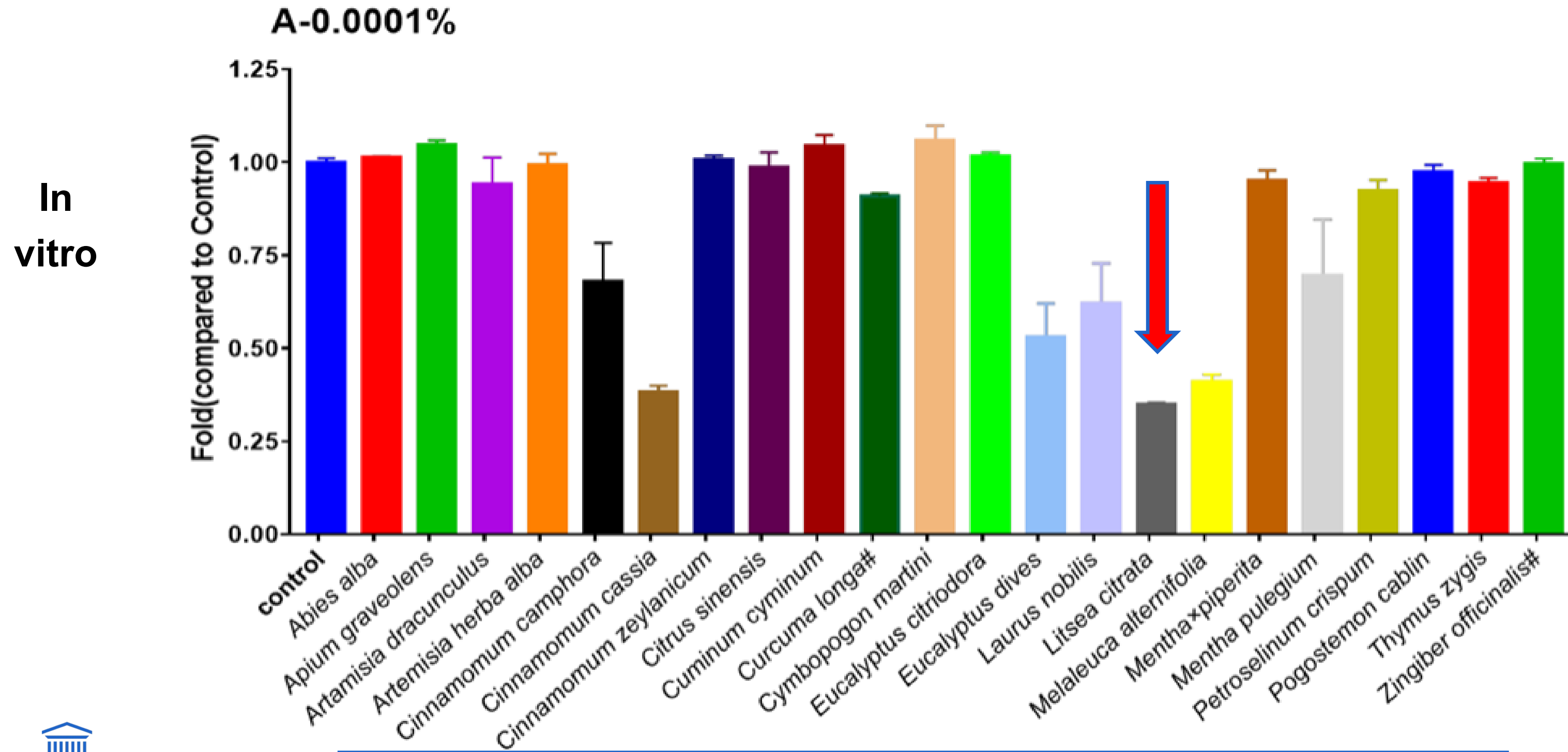


CLASSICAL GROWTH INHIBITION OF VIBRIO BB120 BY ESSENTIAL OILS

In
vitro

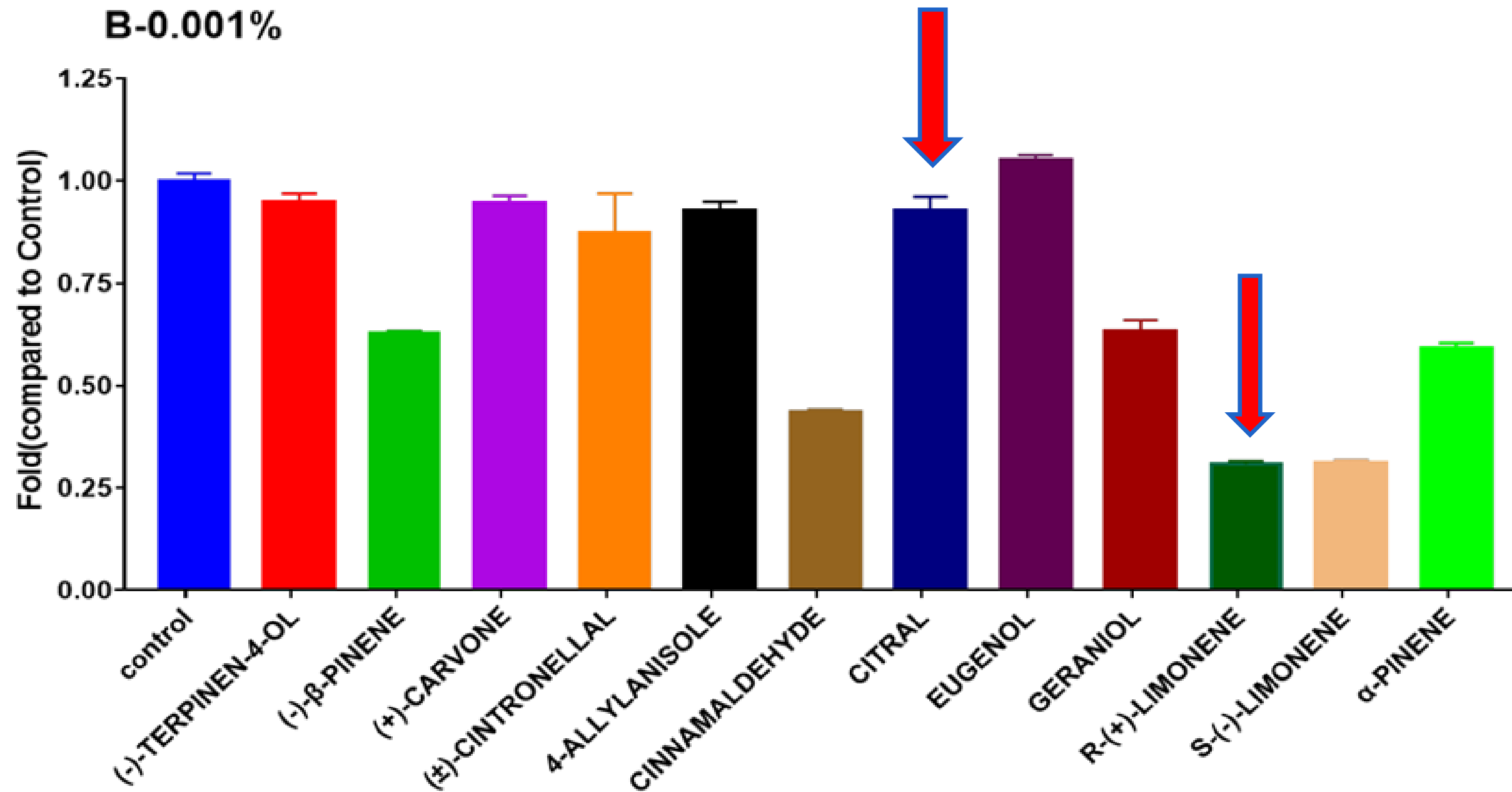


CLASSICAL GROWTH INHIBITION OF VIBRIO BB120 BY ESSENTIAL OILS



GROWTH INHIBITION OF VIBRIO BB120 BY ESSENTIAL OIL COMPOUNDS

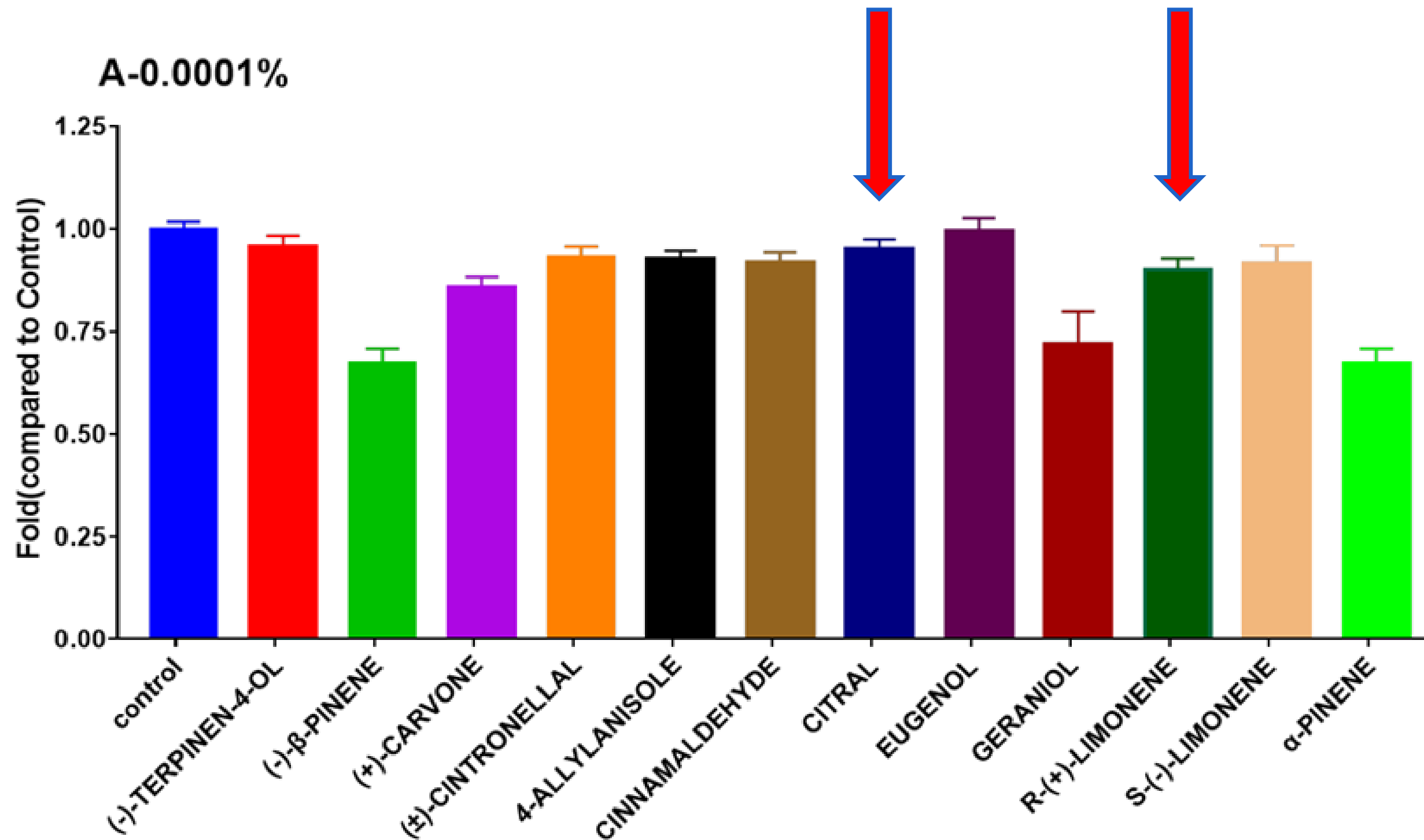
In
vitro



Essential oil compounds from plants (+/- 10mg/l)

GROWTH INHIBITION OF VIBRIO BB120

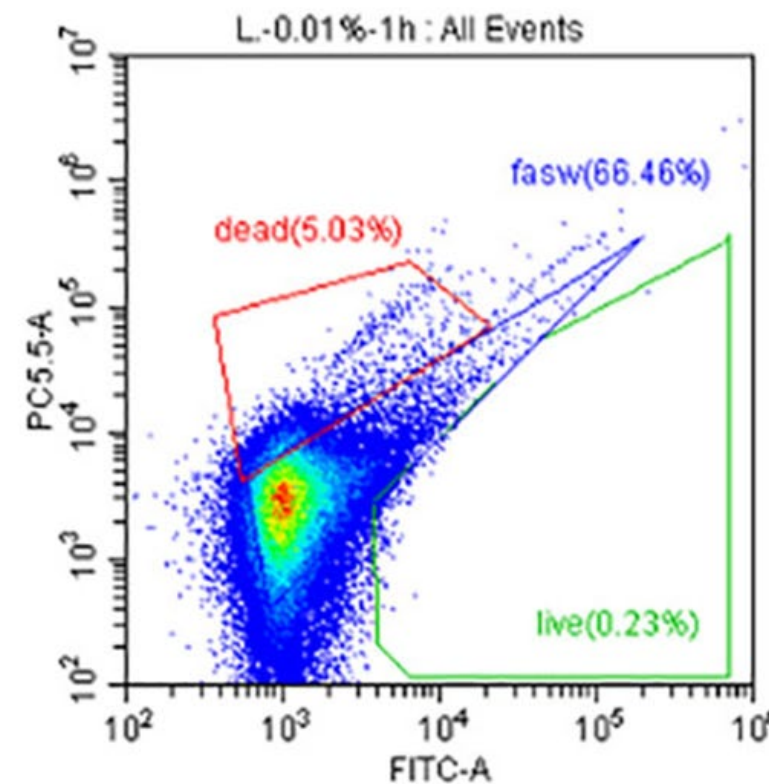
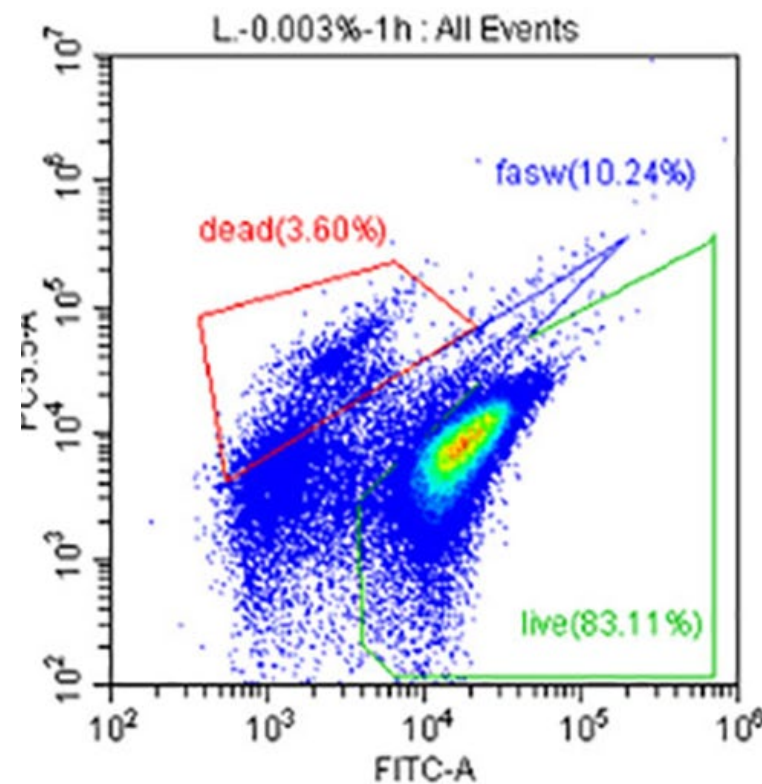
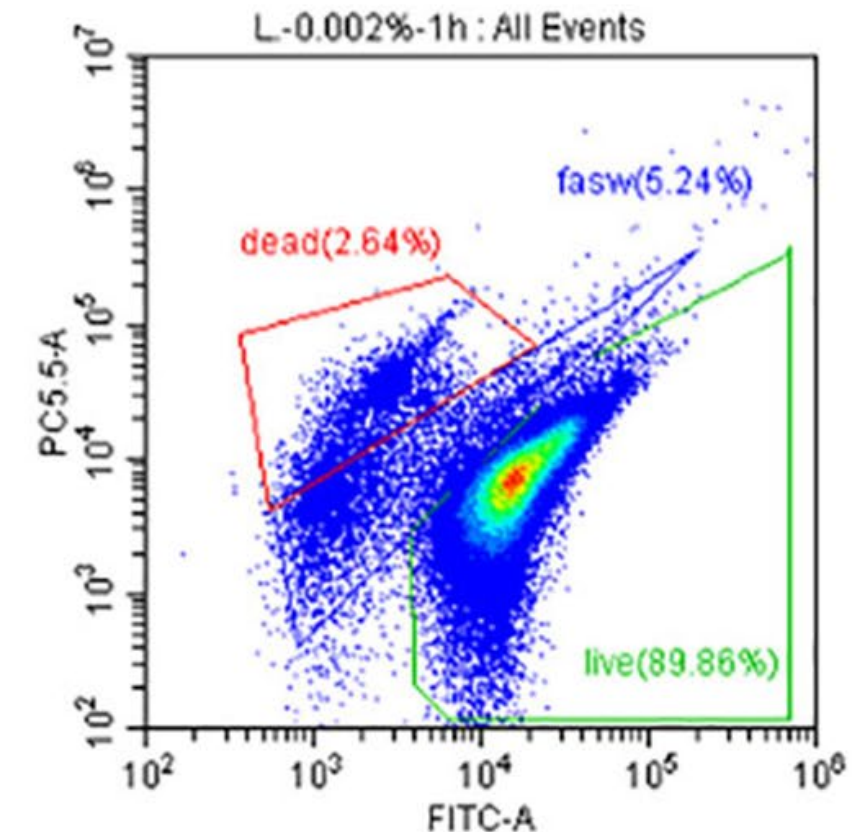
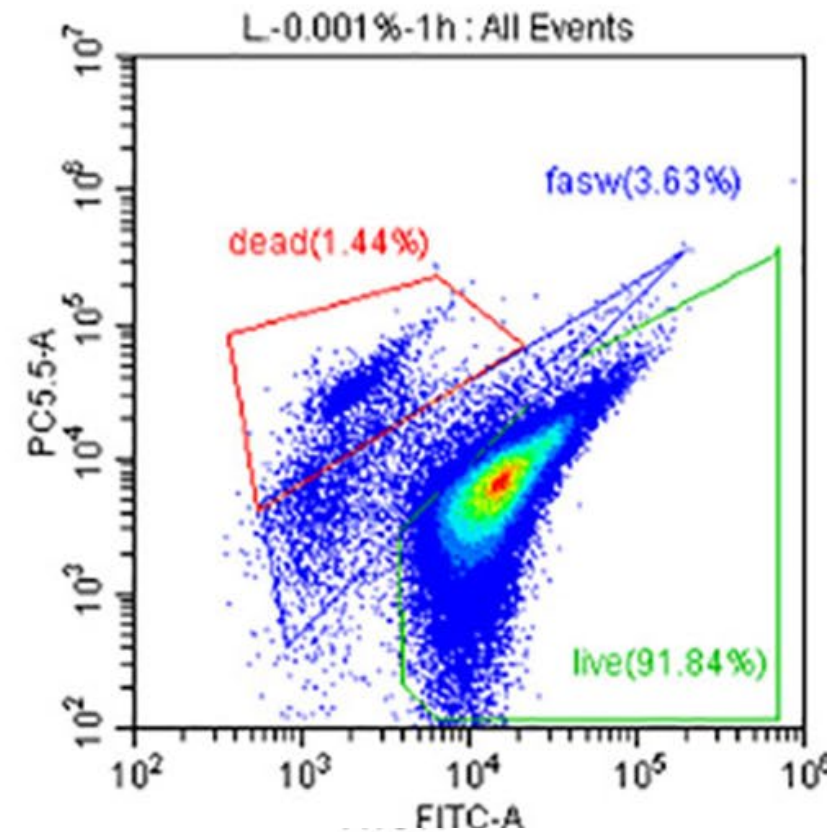
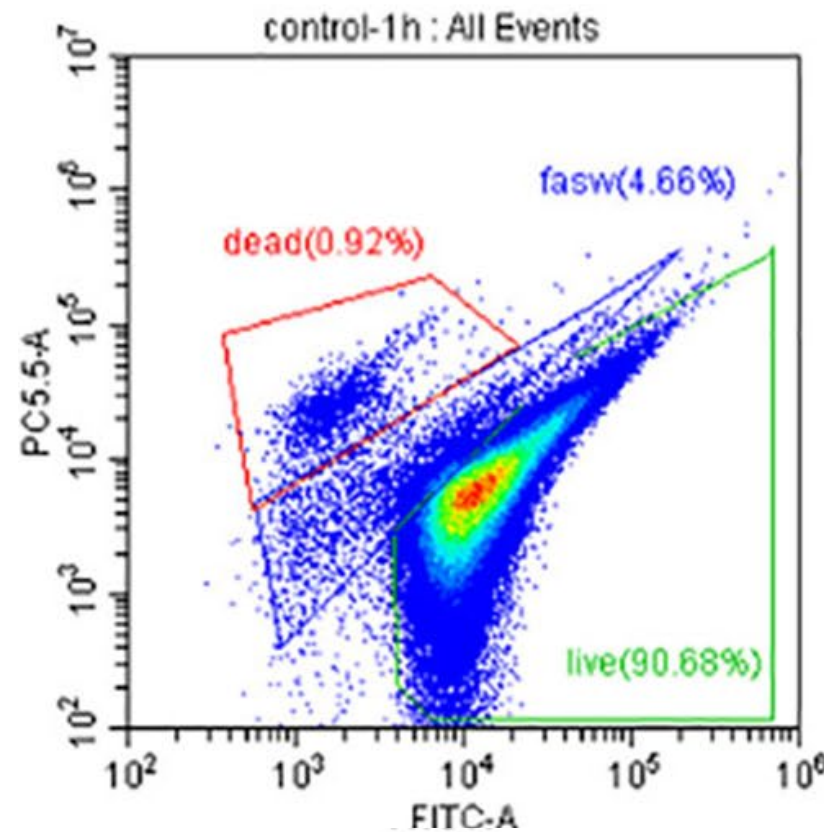
In
vitro



Essential oil compounds from plants (+/- 1 mg/l)

LIFE/DEAD STAINING: EFFECT OF LITSEA EO

In
vitro

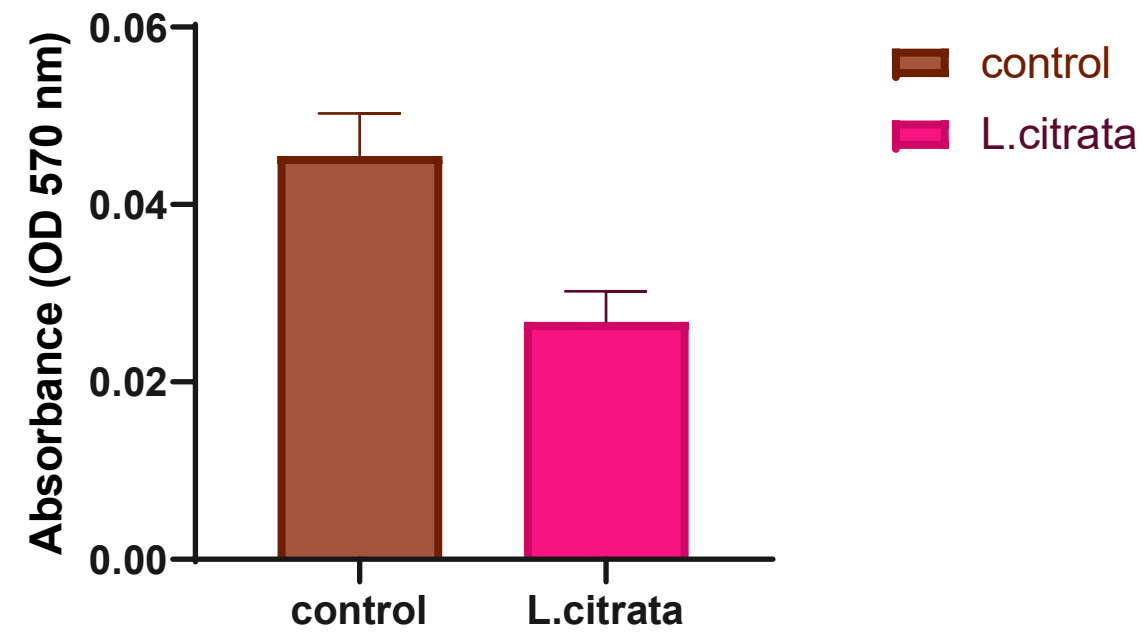


5% killing and
68% damaged cells at
0.01% essential oil
28°C for 1 h on the rotor (6 rpm).

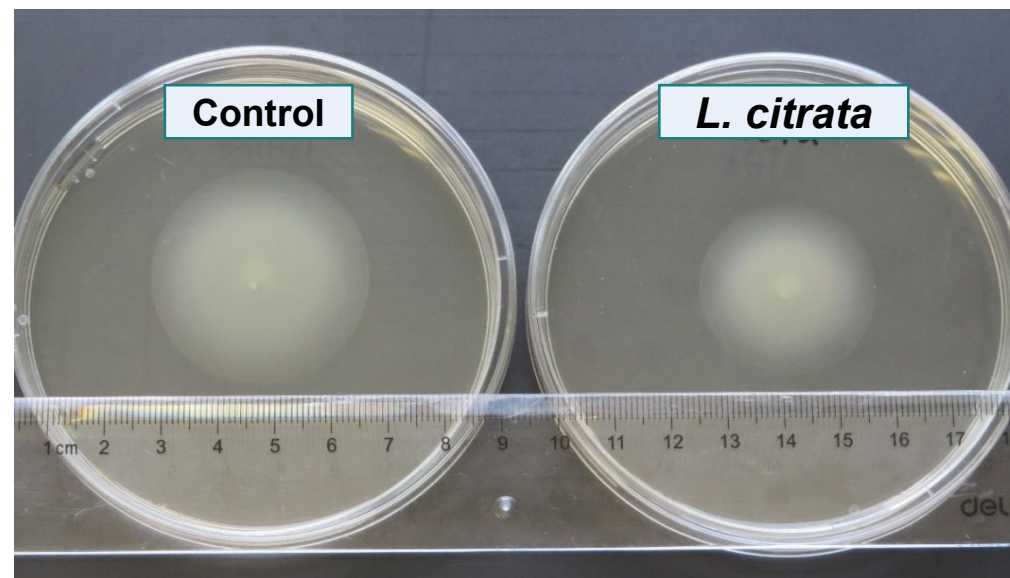
In vitro virulence test and regrowth performance of *V. campbellii*

0.002%

Biofilm formation

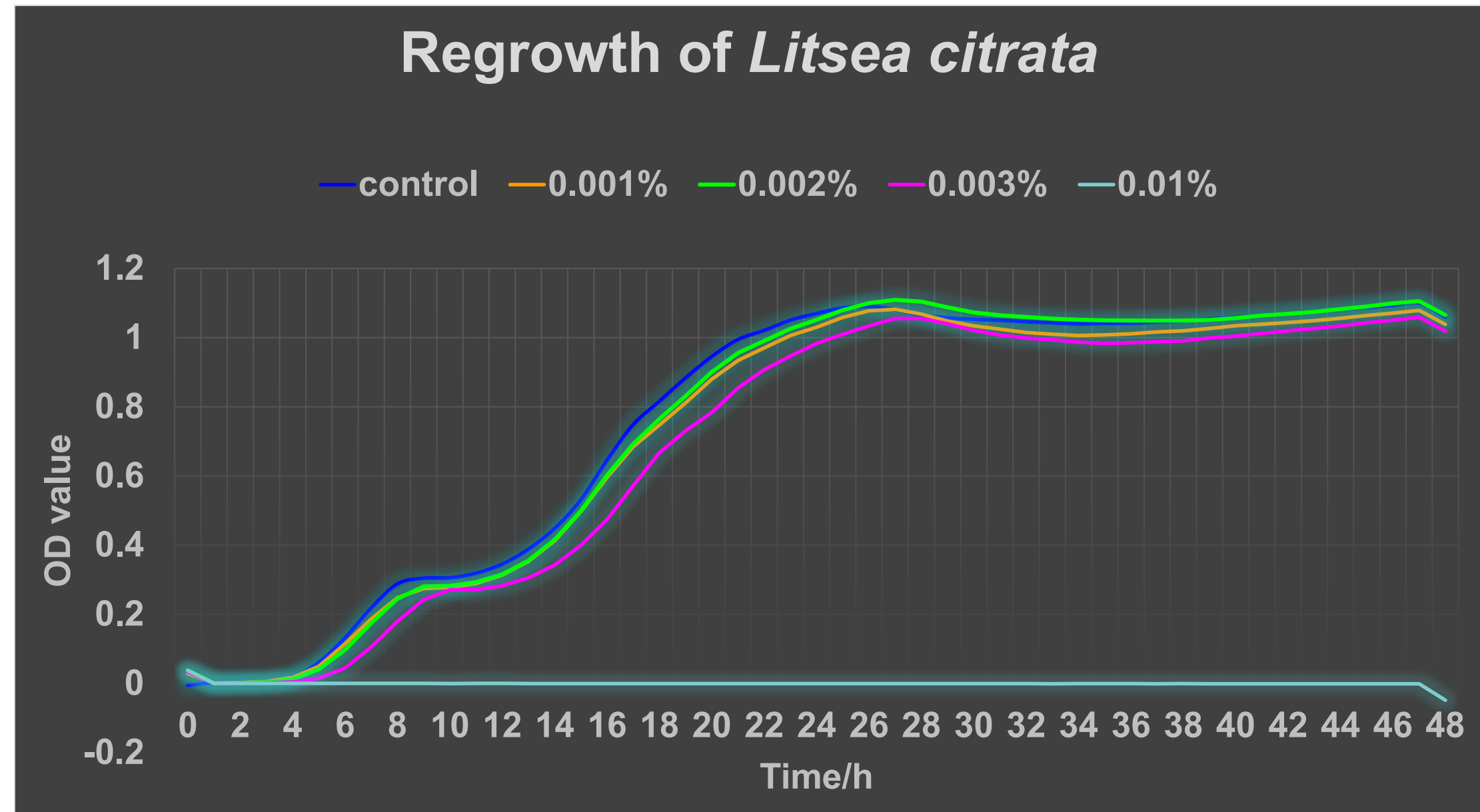


Swimming motility

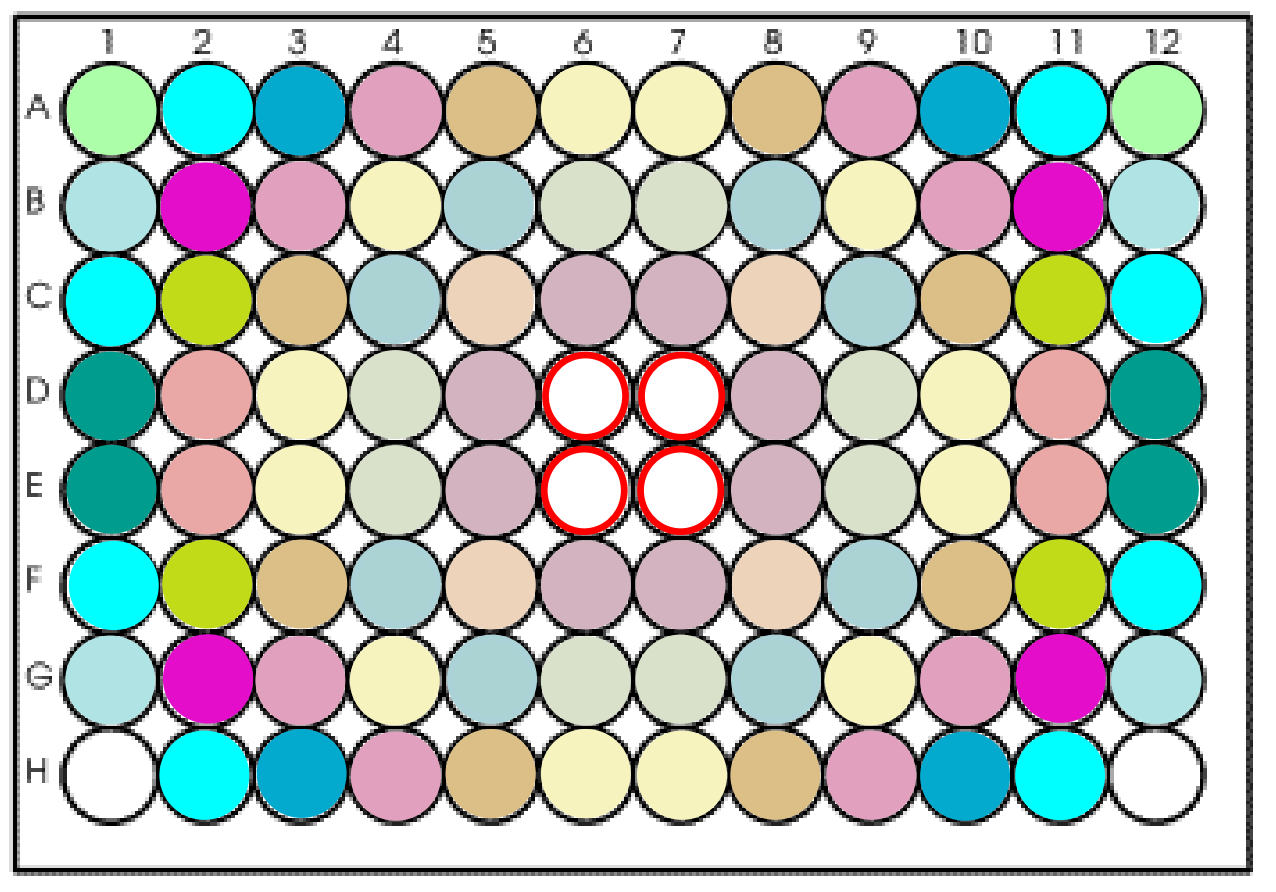


In
vitro

Regrowth of *Litsea citrata*



Vapour-phase-mediated susceptibility assay

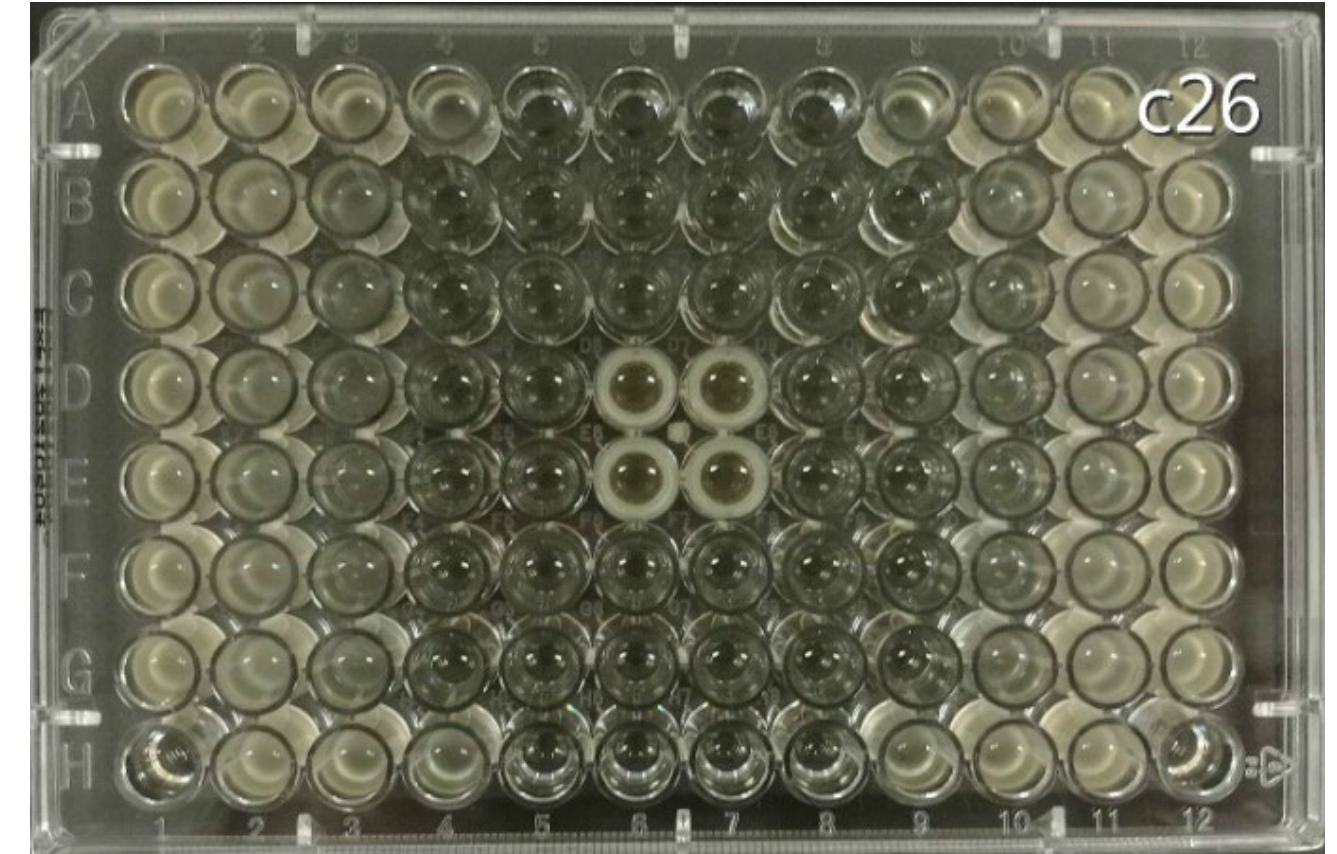
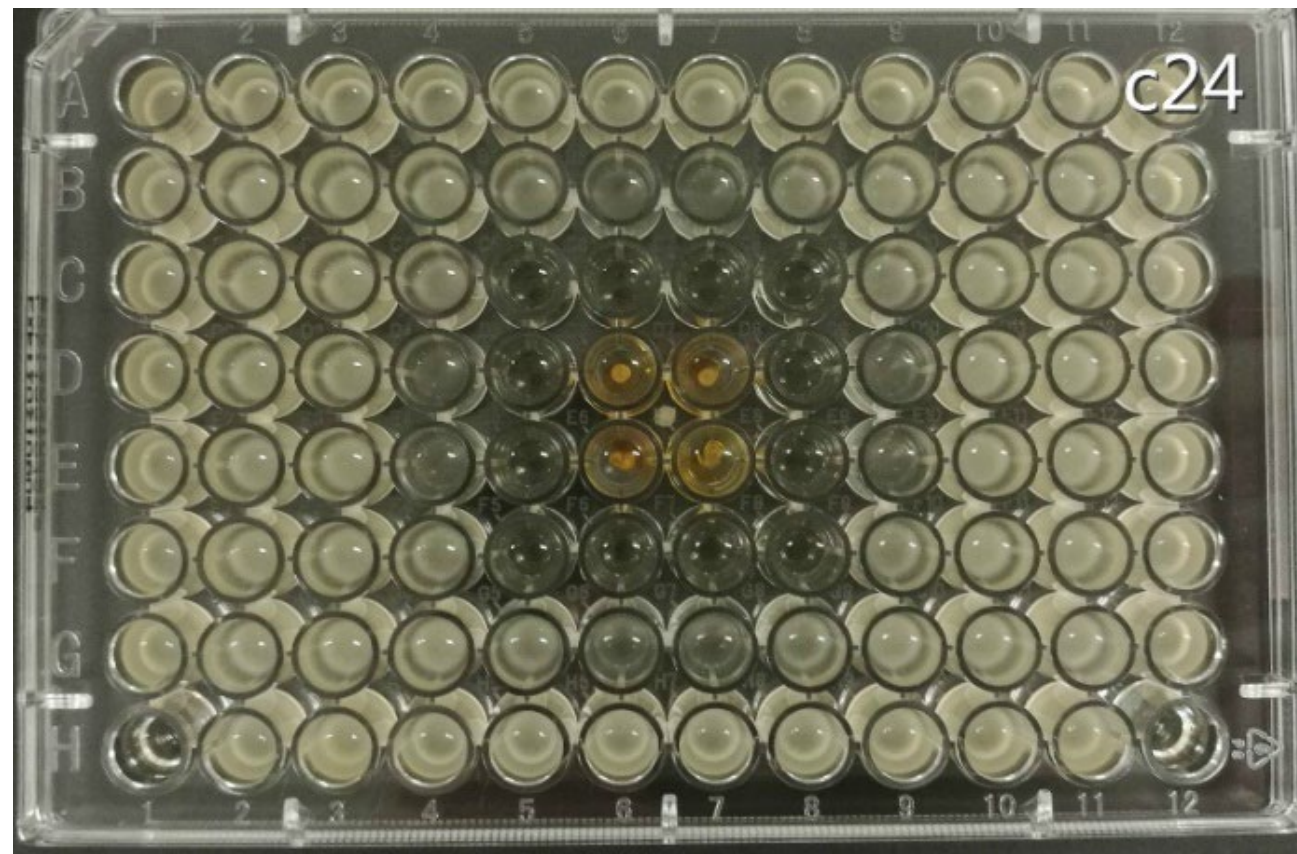


**In
vitro**

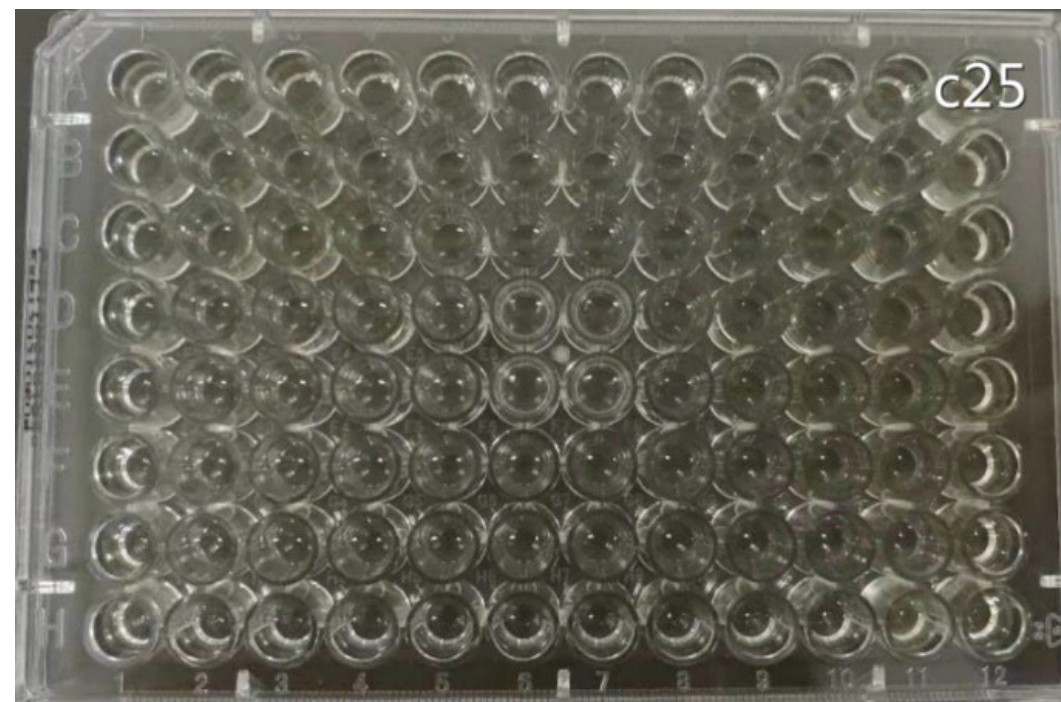
Category	Number of wells per category cumulative number of wells	Distance from volatility-center(mm)
0	0 0	0.0
1	8 8	0.9
2	4 12	5.8
3	8 20	9.7
4	8 28	13.0
5	12 40	18.6
6	8 48	21.0
7	8 56	25.5
8	4 60	27.5
9	4 64	29.5
10	4 68	31.1
11	4 72	33.1
12	4 76	36.5
13	8 84	38.1
14	4 88	41.2
15	4 92	45.5

(Feyaerts, A. F. *et al* 2018)

Vapour-phase-mediated susceptibility assay with *Vibrio*

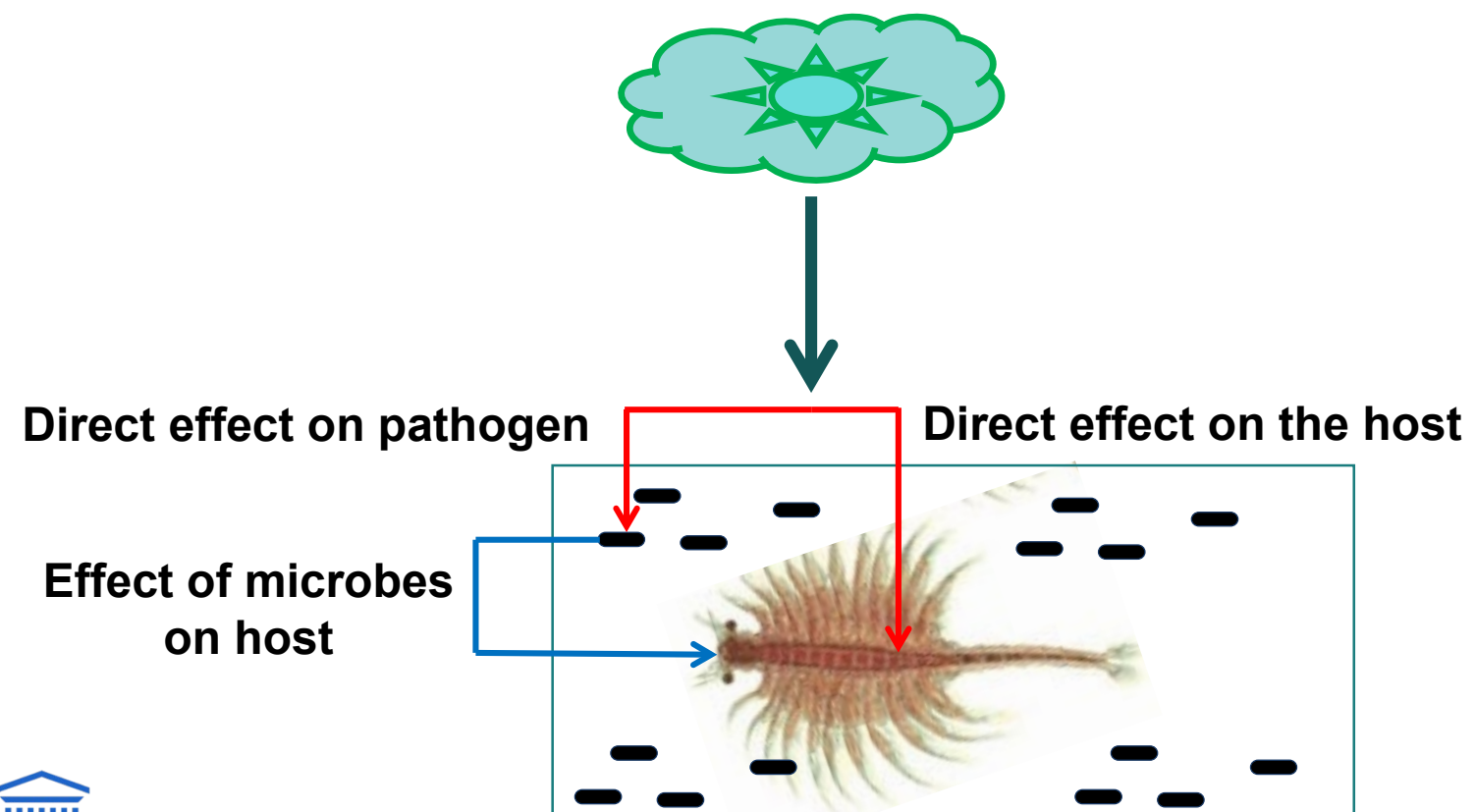


**In
vitro**

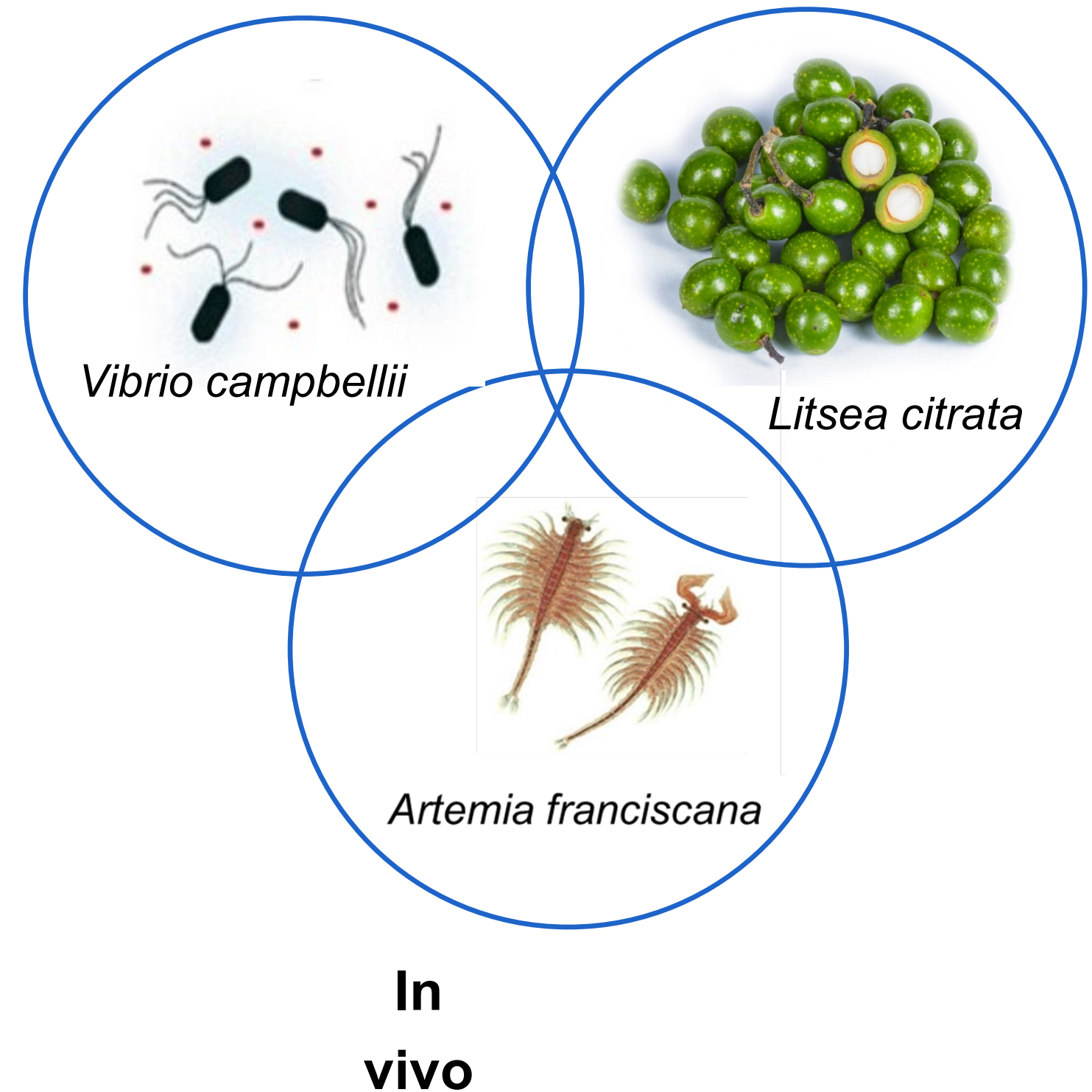


Artemia franciscana model system

- Shares high homology with shrimps and other crustaceans genomes
- Gnotobiotic (germ-free) animal model system



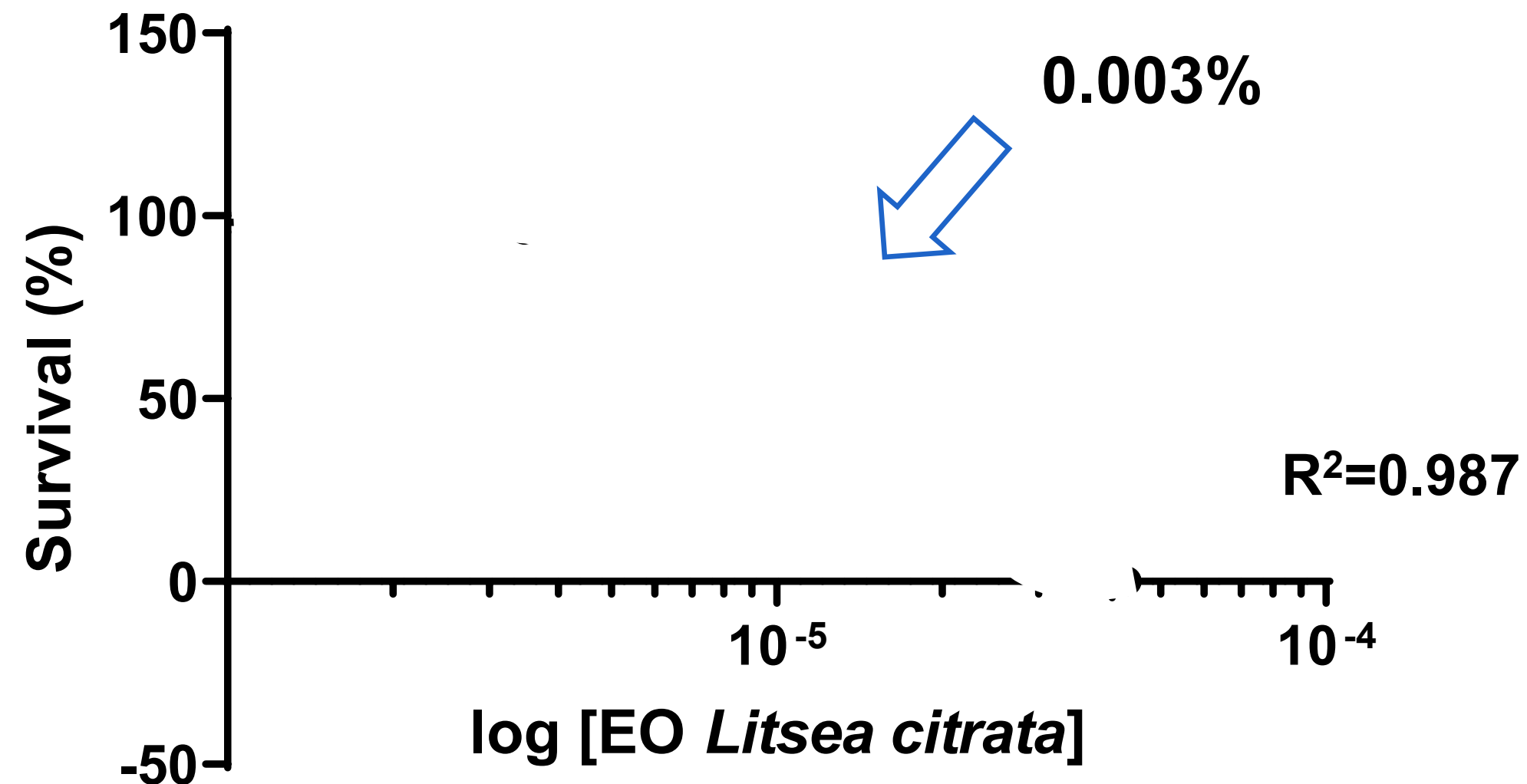
Infection model for *Vibrio* was developed



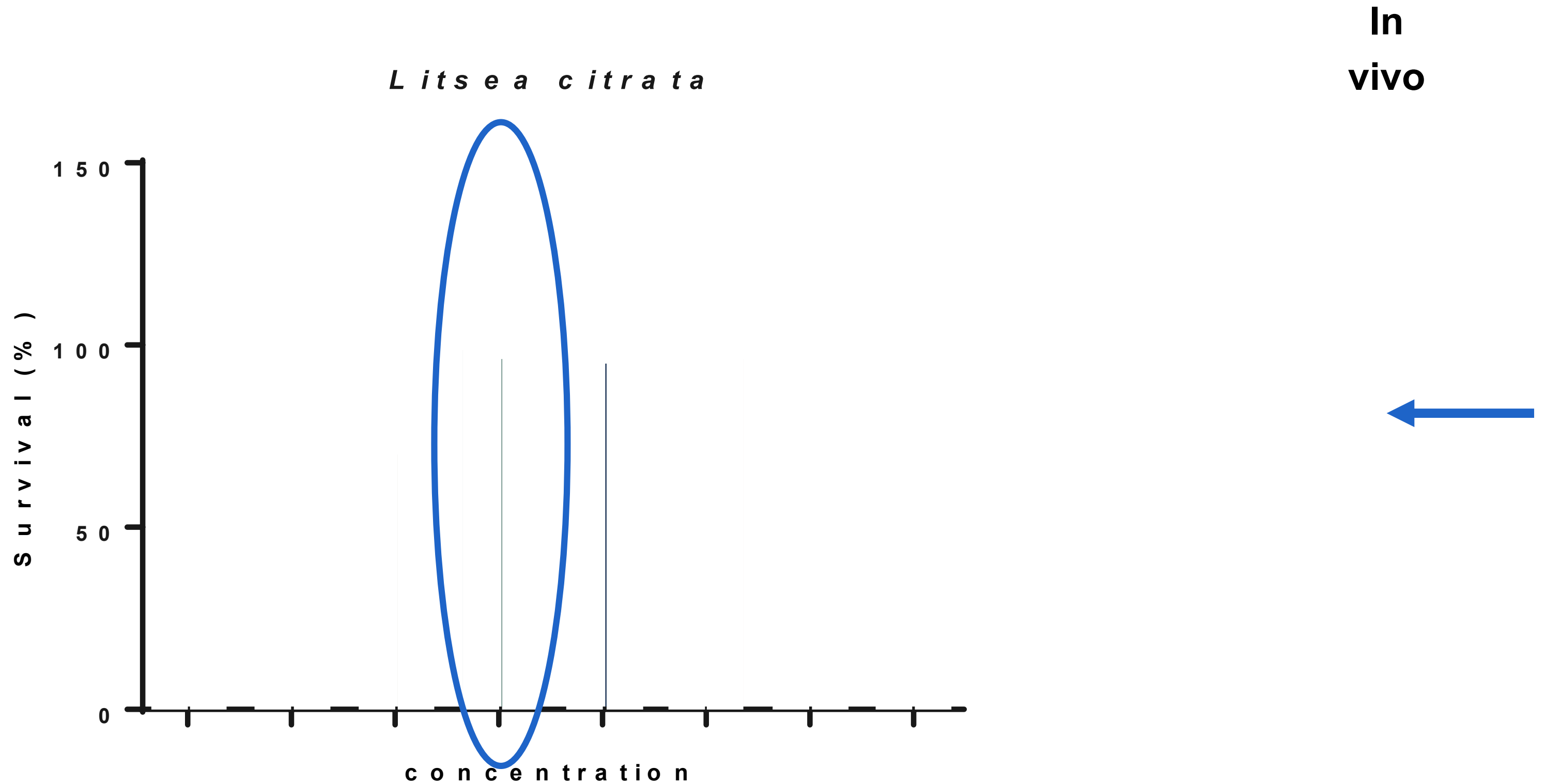
TOXICITY TOWARDS ARTEMIA NAUPLII

In vivo* toxicity of *Litsea citrata

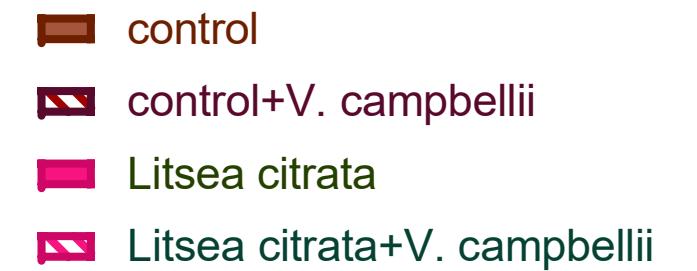
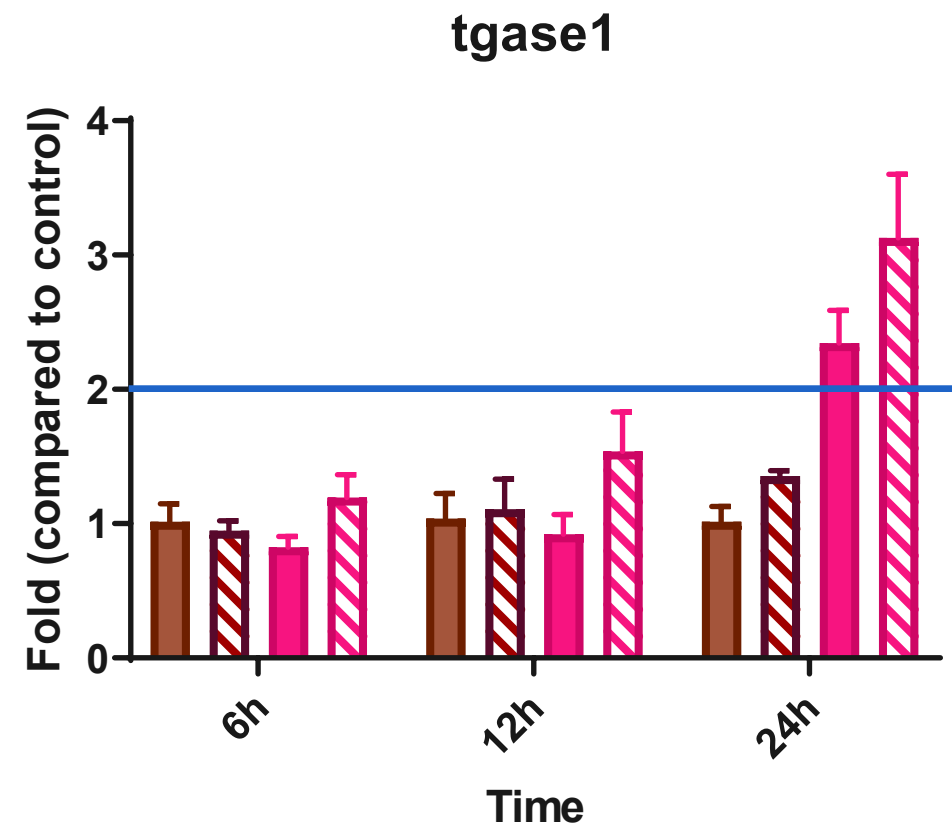
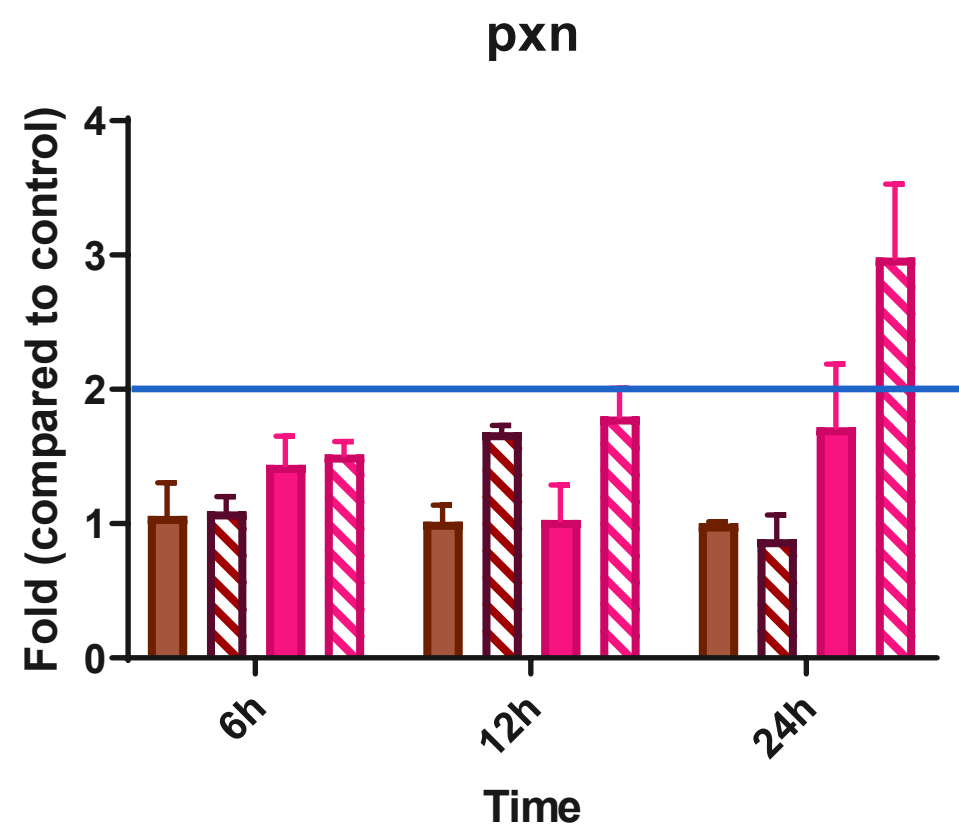
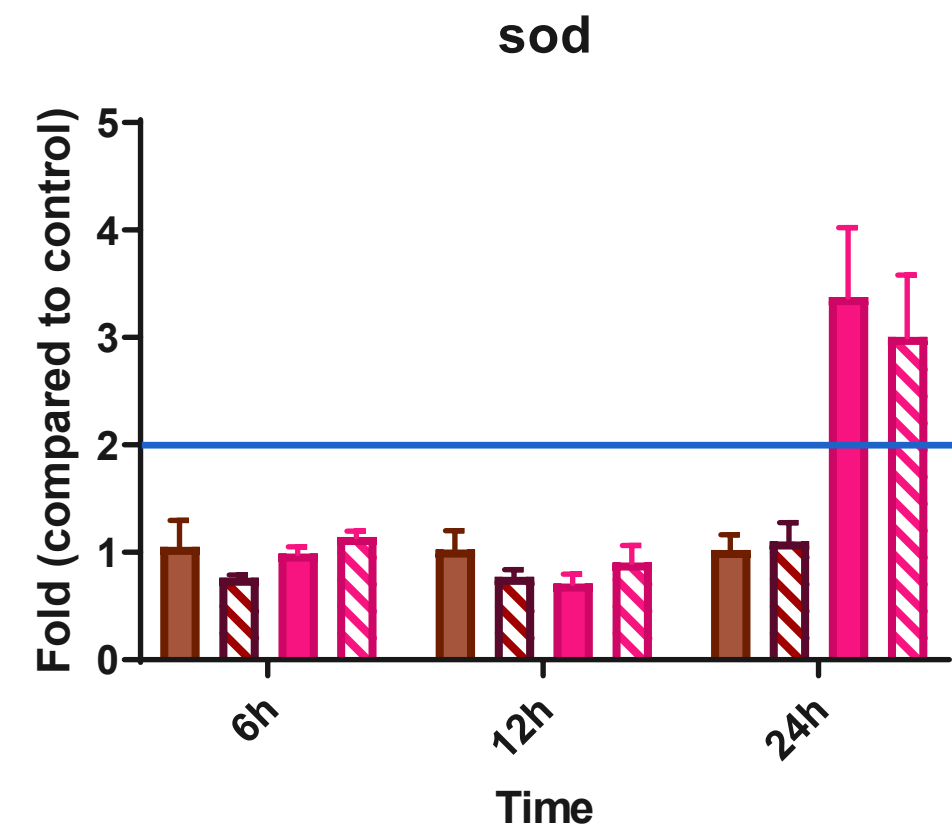
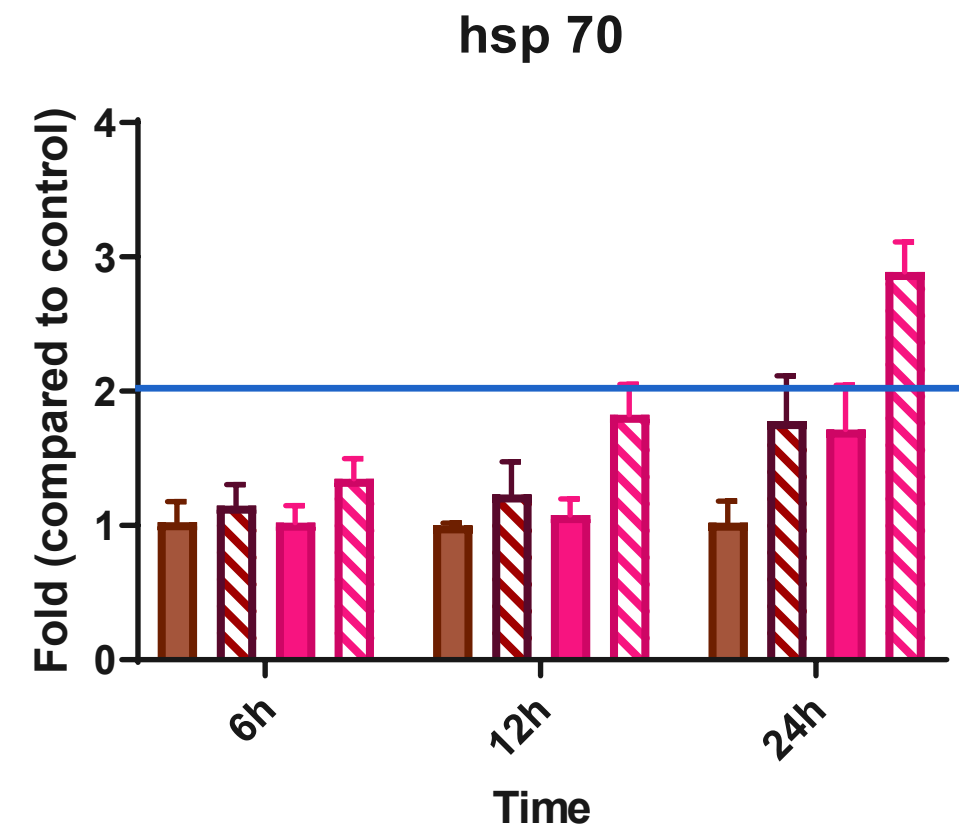
**In
vivo**



Artemia survival upon *V. campbellii* challenge



Relative immune genes expression in *Artemia* (*Litsea EO* at 0.002%)

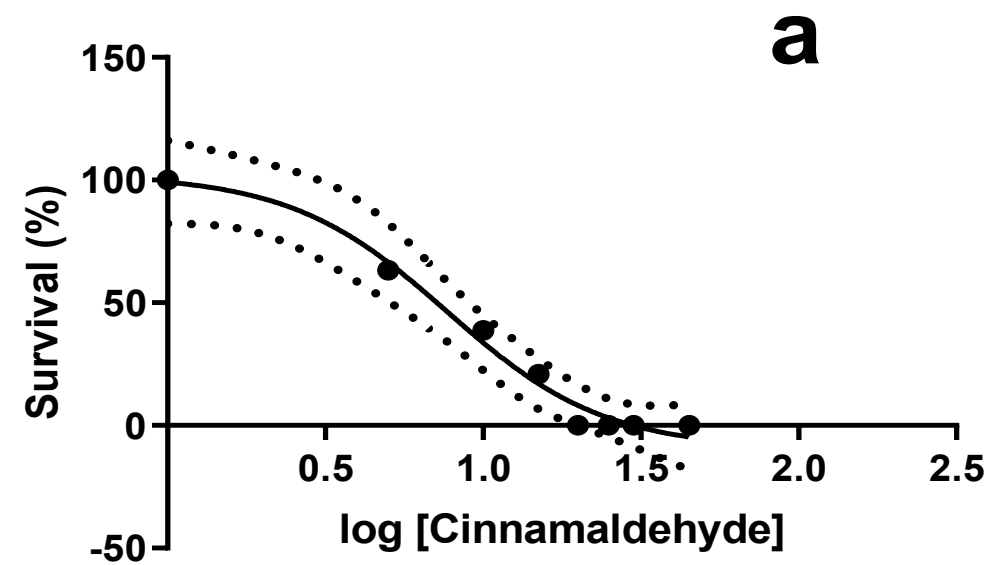


APPLICATION OF EO CINNAMALDEHYDE AT YAGUACAM SHRIMP HATCHERY, CUBA

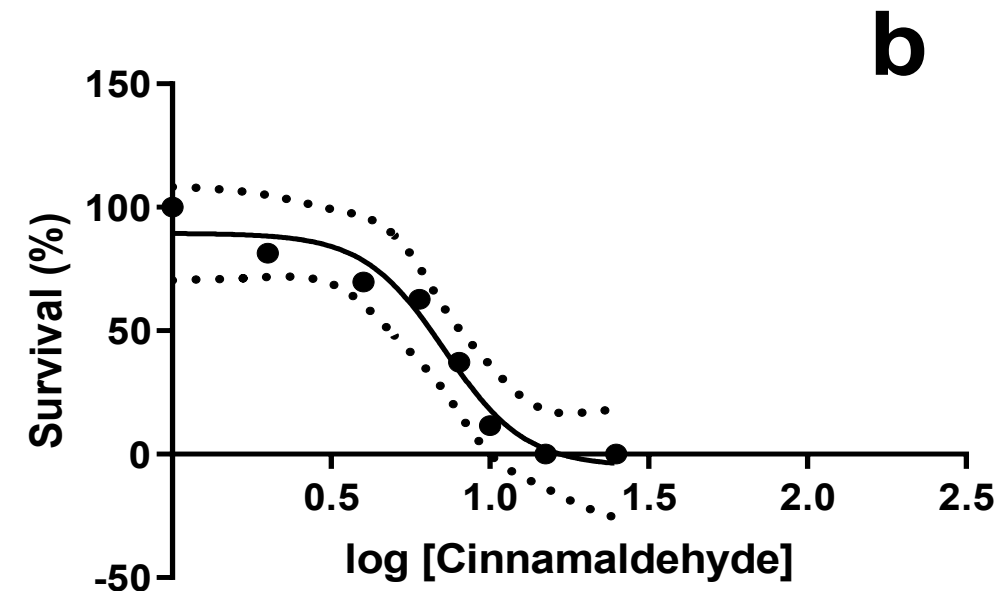


TOXICITY TO VARIOUS LIFE STAGE OF VANNAMEI

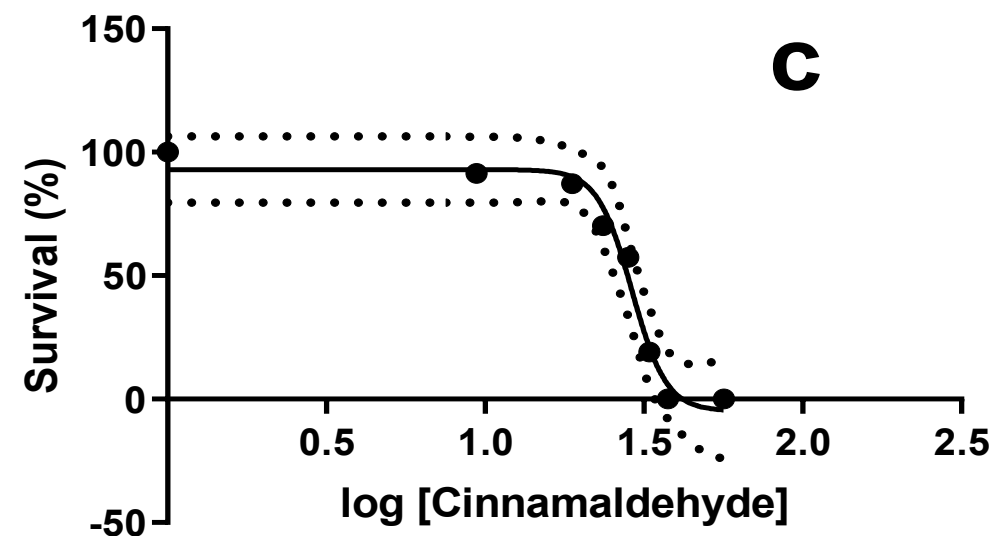
Protozoa I



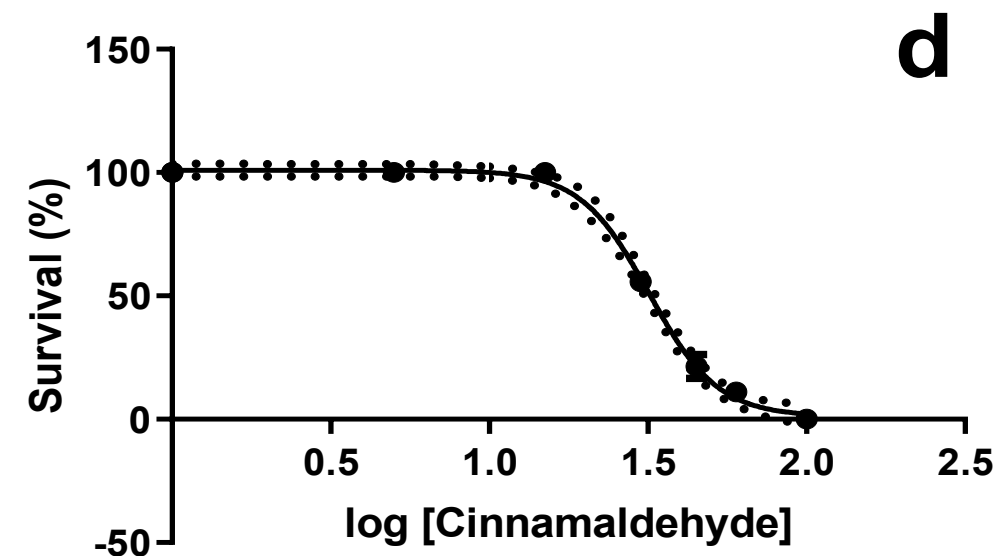
Mysis I



Postlarvae 1



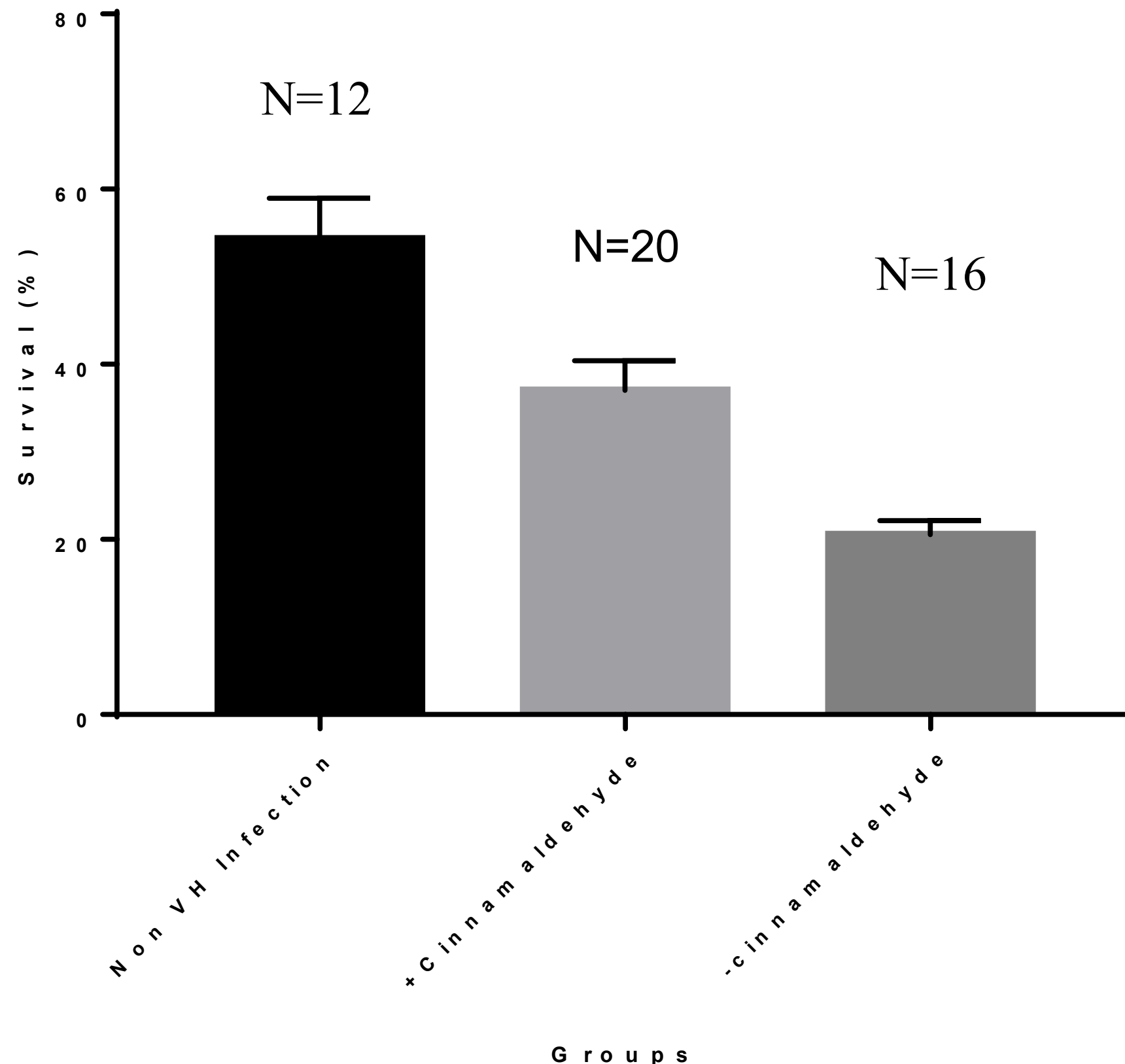
Postlarvae 8



LC50: 1 to 4 mg/l or 0.0001% to 0.0004%

Survival rate of *P. vannamei* PL during outbreaks of luminous vibriosis

Cinnamaldehyde at 2 μ M (0.26mg/L or 0.00002%)



20 000 liter tanks

CONCLUSIONS

- ◆ Essential oil of *Litsea citrata* at 0.0005% can significantly improve the survival of *Artemia* when challenged with *Vibrio campbellii*
- ◆ *L. citrata* enhanced immune genes (hsp 70, sod pxn and tgase1) expression contributing to protecting *Artemia* against *V. campbellii*
- ◆ *L. citrata* decreased biofilm formation and swimming motility of *V. campbellii*
- ◆ *In vivo* mode of action probably a combination of inhibition of certain phenotypic characteristics and immunostimulation at the level of the host
- ◆ Cinnamaldehyde works at hatchery level in Cuba to prevent luminescent vibriosis

GRACIAS
СПАСИБО
DZIĘKI
CẢM ƠN
GRAZIE
MERCI
TAK
THANK YOU
DÊKUJI
ありがとうございました
謝謝
OBRIGADO
TACK
HVALA
DANKE
TEŞEKKÜRLER