

ESSENTIAL OILS VS. ARCOBACTER

How the RTS-8 bioreactor delivered the real-time growth curves behind a study of clove and thyme oils against Arcobacter (Hofmeisterová et al., *Antibiotics* 2024).



BACKGROUND

Arcobacter is a spiral, Gram-negative bacterium and an emerging waterborne and foodborne pathogen – found in up to **~100% of wastewater** and 24–100% of river water, and multidrug-resistant like Campylobacter. With antibiotic resistance rising, Hofmeisterová et al¹ tested natural clove and thyme essential oils against it and common bacteria.

THE CHALLENGE

- Arcobacter grows slowly to low optical densities, so its response to an antimicrobial is **easy to miss with a single endpoint read**.
- Two oils had to be screened across a wide dose range (32–1024 µg/mL) and eight strains, separating inhibition from mere bacteriostasis.
- Manual sampling over 24 h **would be laborious, error-prone and would disturb the low-biomass cultures**.

THE SOLUTION – AUTOMATED GROWTH MONITORING

- Cultures grew in 50 mL single-use cultivation tubes (10 mL BHI) across the full oil dose series, run in the RTS-8 at 30/37 °C and 500 rpm.
- The RTS-8 read OD₆₀₀ automatically every 30 min for 24 h across eight parallel channels – without ever opening a tube.
- Non-invasive Reverse-Spin® monitoring resolved lag, partial recovery and full suppression that endpoint MICs miss.

RESULTS & KEY TAKEAWAYS

- Both oils were antibacterial, thyme strongest; Arcobacter's thyme inhibition zones reached 37–47 mm, often beating reference antibiotics.
- RTS-8 curves showed dose-dependent suppression – most Arcobacter inhibited by thyme from ~128 µg/mL – confirming MICs of 512–1024 µg/mL.
- Sub-inhibitory doses (1–32 µg/mL) sometimes boosted biofilm, so dosing matters – a caution the study's biofilm assay reported.

¹ Hofmeisterová, L., Bajer, T., Walczak, M. & Šilha, D. Chemical Composition and Antibacterial Effect of Clove and Thyme Essential Oils on Growth Inhibition and Biofilm Formation of Arcobacter spp. and Other Bacteria. *Antibiotics* 13, 1232 (2024). doi.org/10.3390/antibiotics13121232

AT A GLANCE

APPLICATION

Arcobacter spp. growth under clove/thyme oils · BHI · 30–37 °C

CHALLENGE

Screen two oils across a wide dose range; inhibition vs. killing

APPROACH

Automated OD₆₀₀ curves; 8 channels; 30-min reads over 24 h

KEY RESULT

Thyme > clove; Arcobacter hit from ~128 µg/mL; MIC 512–1024

OUTCOME

Curves confirmed MICs; **automated monitoring cut 24 h of manual sampling labor**; study also flagged biofilm risk at low doses

RTS-8

THE INSTRUMENT



Automated, non-invasive OD₆₀₀ – continuous growth curves in single-use cultivation tubes

8 parallel channels – media, strain & dose screens in one run

OD range up to 100 OD₆₀₀ equivalent · Reverse-Spin® mixing 150–2700 rpm

Temperature +15 to +60 °C · 3–50 mL cultivation tubes · PC logging & export