

AR
BIOTECH



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VIBRIO DETECTOR

BACKGROUND

Vibriosis is one of the most severe bacterial diseases in aquaculture & is caused by the infection of pathogenic and/or opportunistic Vibrio bacteria. It can lead to mortality of up to 100 percent and is estimated to cause the shrimp sector US\$ 3 billion in global losses a year.

PROBLEMS IN AQUACULTURE

Vibrio is a common bacterial pathogen found in aquaculture, leading to significant aquaculture infections.



Vibrio spp: V. alginolyticus V. vulnificus V. harveyi V. parahaemolyticus V. carchariae	Vibriosis on fish causes: Rotting of fin, bleeding of ulcer & internal organs. High vibrio concentration causes fatality within 2 days , more than 90% mortality in affected population.
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CONVENTIONAL DETECTION METHOD CHALLENGES

- Common lab based methods: Bacteria plate count (TCBS); Polymerase Chain Reaction (PCR)
- Normally takes 1~2 Days from sample to results
- Skilled labour intensive
- Relatively high cost of detection



AR BioTech Proudly Offers:

- Better: On-site Rapid Vibrio Detection
- Cheaper: Reduce 30-50% of the conventional cost
- Faster: Results within minutes

TECHNOLOGY DIFFERENTIATION

Current Bacteria Detection Methods

2-7 Days

Culture Method:

In lab setting, cannot detect unculturable species; required highly trained personal.

18-44 Hours with Pre-treatment

Molecular Method:

PCR (E.g BAX, 44 Hours needed)
3M Molecular Detection System (Cell lysis at 100°C, isothermal amplification, DNA cleavage enzyme)



Unmet Needs

- Rapid
- Low cost
- Portable for on-site detection
- Automated for continuous measurement

LEVERAGING ON A*STAR VIBRIO DETECTION NANOSENSOR

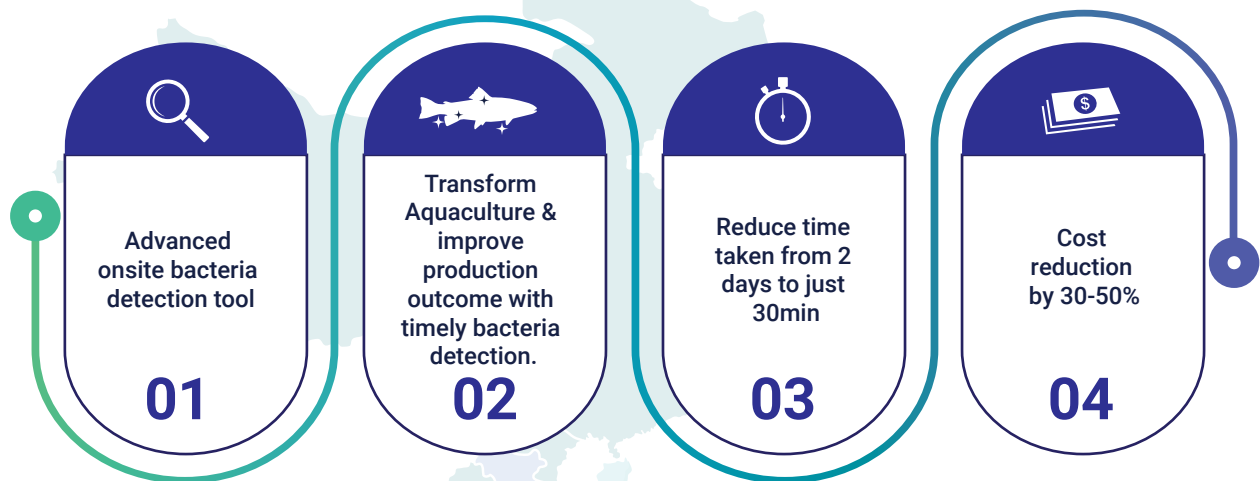
30 minutes with no Pre-treatment

Whole cell detection: Bacteria detection using inorganic nanoreagents & a portable detector for rapid on-site detection in complex sample matrix.

HOW ARE WE DIFFERENT?

Vibrio Detection	Plate count using Vibrio specific medium (TCBS, Vibrio Chromo)	Polymerase chain Reaction (Bio-rad, Hygiena, ThermoFisher, Qiagen)	Biochemical identification (RapID, API, Microbact Id)	ARBiotech
Mechanism	Bacteria culture on agar & colony counting	Bacteria DNA extraction & replication by matching probes	Enzymatic bacteria reaction in chromogenic substrate	Direct staining of bacteria and staining intensity reading
Assay time	1 - 2 Days	2 h	4 - 24 h	30 minutes
Pre-enrichment culture	No	Yes, 18 - 20 Hour	Yes, 1 Day	No
Operation temperature	35°C in incubator	37 - 95°C in PCR thermal cycler	37°C in incubator	Room temperature
Lab setting & on-site use	Requires biosafety level 2 laboratory setting	Requires biosafety level 2 laboratory setting	Requires biosafety level 2 laboratory setting	Handheld, can be used for on-site application
Specificity	Vibrio spp (Aeromonas, Pseudomonas may grow on TCBS at lower temperature)	Vibrio spp	Vibrio spp (only for pure culture)	Specific to Vibrio spp
Limit of detection	25 - 30 ⁴ CFU/ml (1ml sample)	10 CFU/ml after enrichment	Non quantitative	10 ³ CFU/ml (1 ml sample) 10 ² CFU/ml (10ml sample)
Cost per test	10-20 SGD	8-20 SGD	20 - 25 SGD	12 - 15 SGD
Cost of hardware	Incubator: 1500 - 4000 SGD	PCR Thermal cycler: 9500 - 40,000 SGD	Incubator: 1500 - 4000 SGD	Handheld detector: 1350 - 1500 SGD

TRANSFORMING AQUACULTURE BACTERIA DETECTION



WE ARE AVAILABLE IN

- ASEAN
- Singapore ✓
- China ✓
- Malaysia ✓
- Indonesia ✓
- Brunei ✓
- Australia ✓
- Thailand ✓
- Philippines ✓
- Vietnam ✓

HOW TO USE

①



Syringe filter, syringe, nanoreagent, detector.

②



Filtration of 1 ml water sample.

③



Staining with 0.2 ml nanoreagent on the filter, followed by 10 min incubation to allow nanoparticles binding

④



Washing with wash solution, and blow dry the filter with air.

⑤



Enhance optical signal by 0.2 ml enhancement solution, followed by 10 min incubation.

⑥



Washing with wash solution & blow dry the filter with air.

⑦



Detector reading

SAMPLE WATER TESTING

01

Begin



Open Lid

02

End



Insert Sample

03

Sample 1



>801 Extremely Low Vibrio

04

Sample 2



400-600 Mild Vibrio

05

Sample 3



< 399 High Vibrio