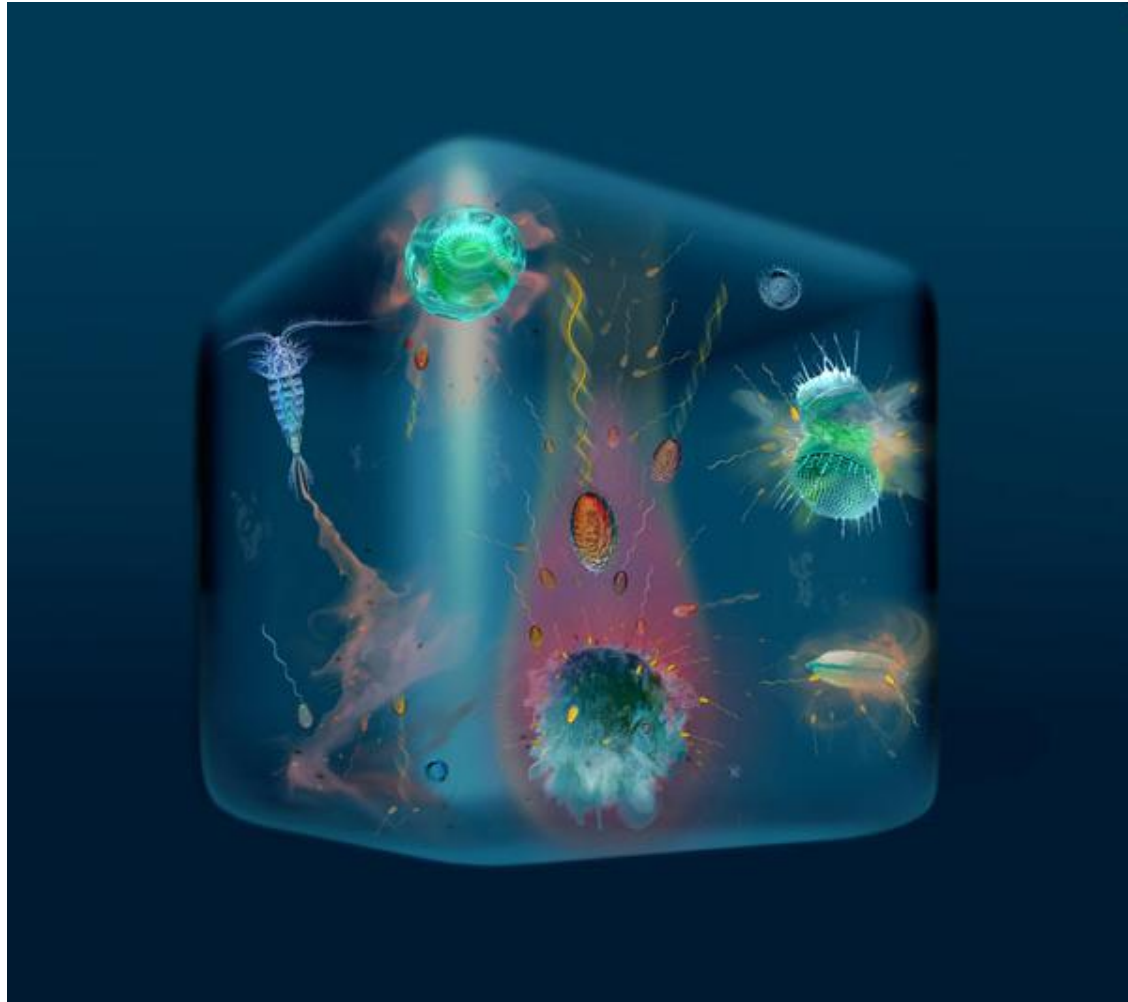




HTS BIO Aquaculture

Smart Science for Sustainable Aquaculture



## About us

### HTS BIO

Dedicated to serving people and the environment since 1988, HTS BIO designs and manufactures biotechnology solutions in partnership with universities and research centers of international notoriety. Our expertise, at the forefront of innovation, enables us to develop safe and effective alternative products to reduce global environmental impact.

### CORE BUSINESS

- Rigorous identification and selection of the most beneficial and effective micro-organisms
- Industrial production of micro-organisms and by-products (biosurfactants, etc.)
- Securing micro-organisms adaptability to ensure their viability and effectiveness
- Conception and production of a very large range of products using micro-organisms and byproducts



Gémenos, FRANCE

## Partners

### SOLID SCIENTIFIC PARTNERSHIPS



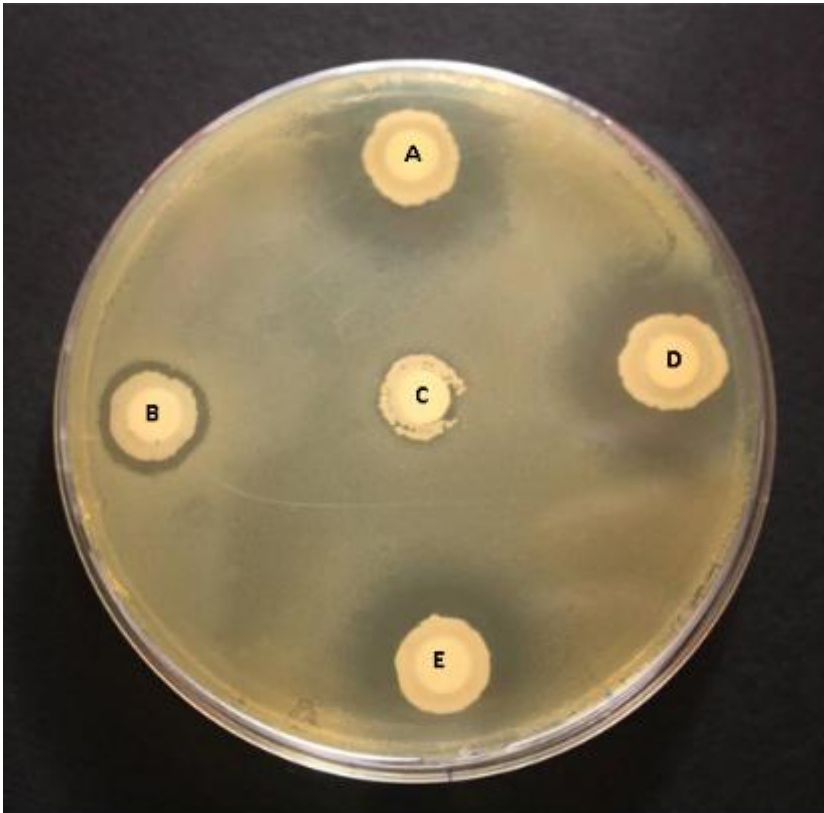
- ✓ CNRS : French National Centre for Scientific Research
  - ⇒ Largest fundamental science agency in Europe
    - 26.000 permanent employees
- ✓ CNRS Institute of Microbiology
  - ⇒ 2° largest center for microbiology in France after Pasteur Institute
    - 450 permanent employees

## Applications

HTS BIO's expertise is applied in **multiples fields with high environmental impact:**

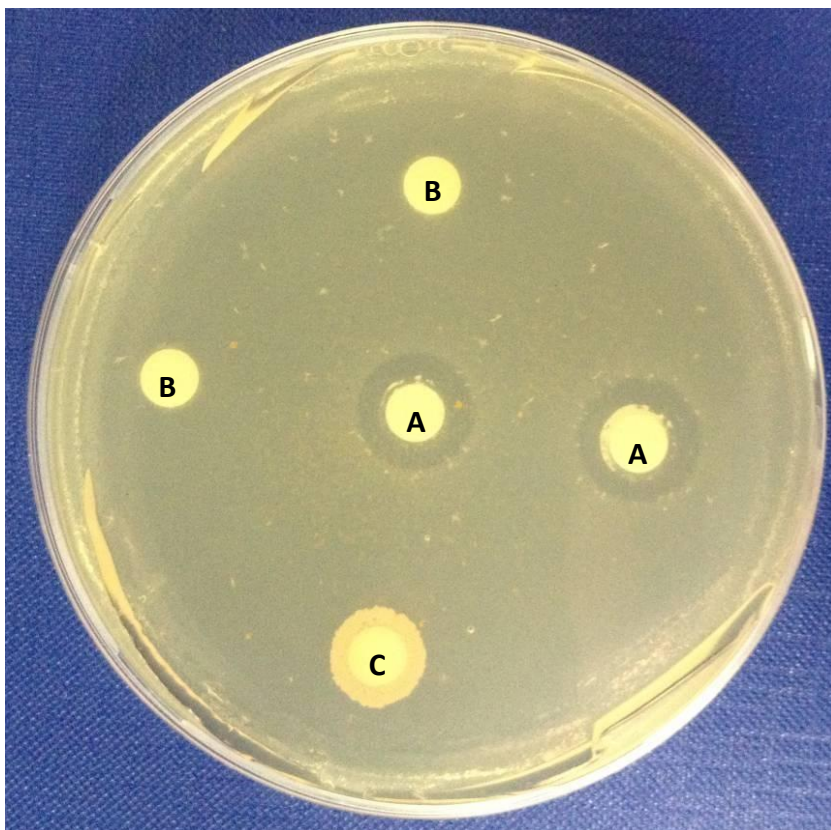


## *Vibrio parahaemolyticus*, 10<sup>6</sup> CFU



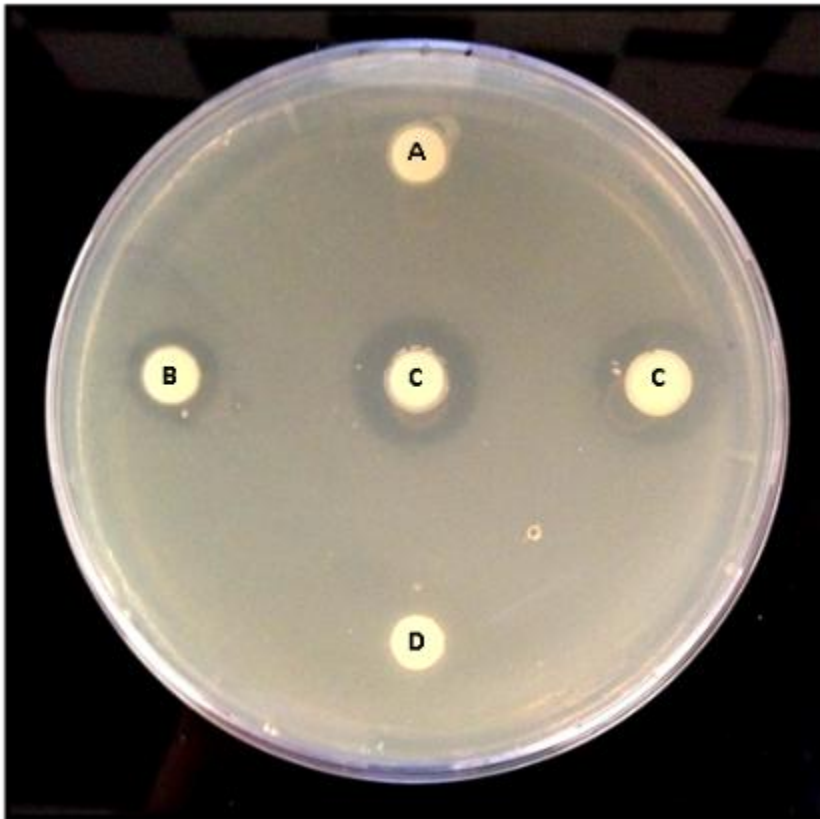
Petri dishes showed inhibitory zones of HTS BIO's *Bacillus* culture against the growth of *Vibrio parahaemolyticus* (10<sup>6</sup> bacteria). The inhibitory efficiency was high with the strains A, D and E.

## *Vibrio harveyi*, 10<sup>6</sup>



Petri dishes showed inhibitory zones against the growth of *Vibrio harveyi* (10<sup>6</sup> bacteria). The inhibitory efficiency was high with the strain A.

## *Vibrio penaeicida*, 10<sup>8</sup> CFU



Petri dishes showed inhibitory zones of HTSBIO's *Bacillus* culture against the growth of *Vibrio penaeicida* (10<sup>8</sup> bacteria). The inhibitory efficiency was high with the strains B and C according to previous observations.



## How it works

### UNIQUE PROCESSES

#### CONSORTIUM®

“Careful selection and acute association of different strains of bacteria to achieve a specific biodegradation goal. This truly replicates what naturally occurs during a complete biodegradation cycle: microorganisms with different enzymatic capacity working in synergy.”

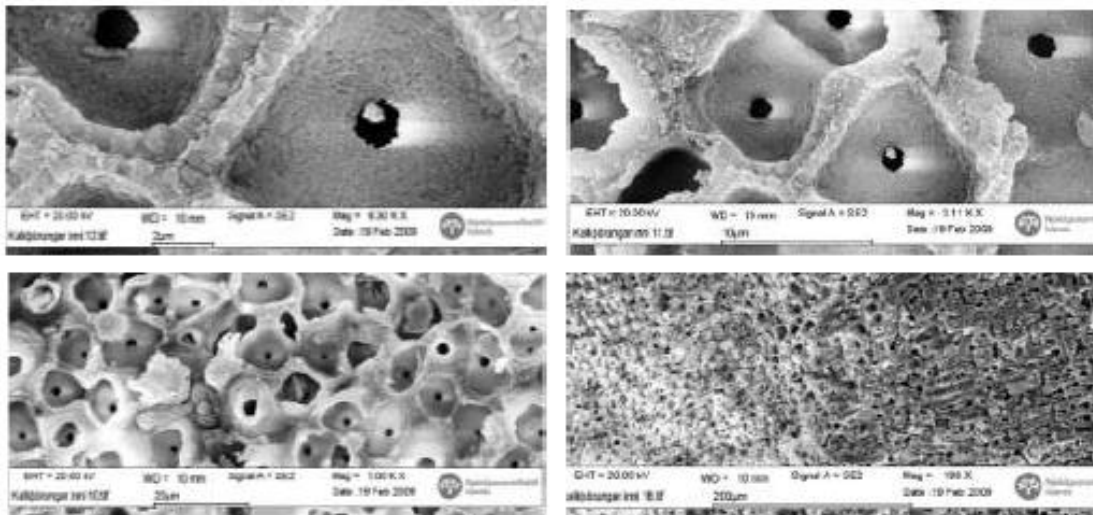


## How it works

### UNIQUE PROCESSES

#### BIOSMOSE®

“Biofixation of specially selected and adapted micro-organisms in specific mineral compounds.”



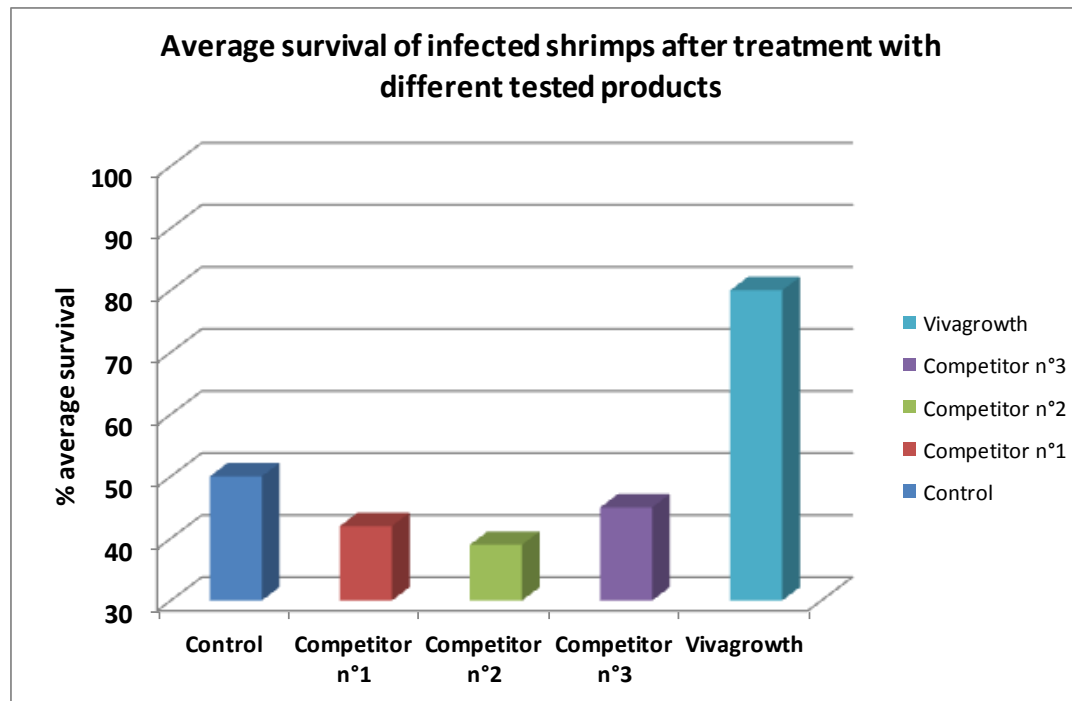
*The pictures above show different zooms of the crystalline structure of one of the mineral compounds used by HTS BIO*

#### Benefits:

- retains water, carbon dioxide, nitrogen, ammonia, sulfurs, etc.
- fix, protect and ensure adaptability of micro-organisms
- facilitates localized treatment by preventing dispersion of micro-organisms

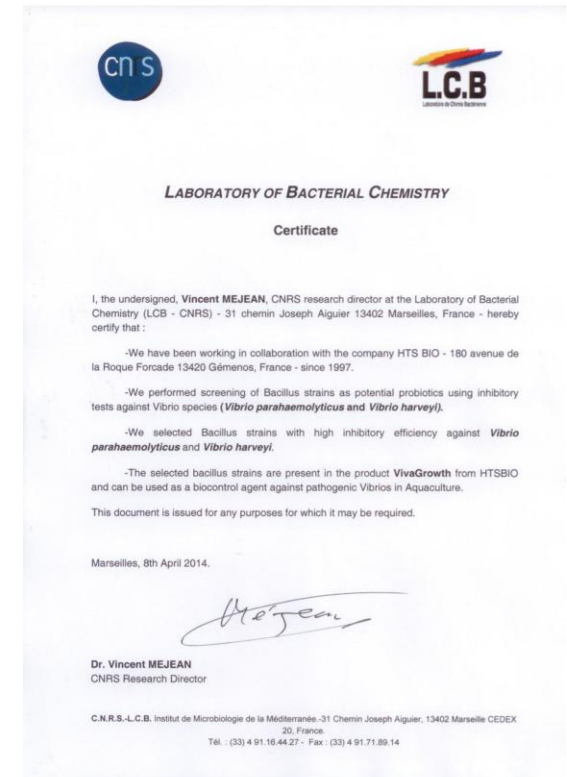
## VIVAGROWTH® - Experimental infection of shrimps with *Vibrio spp.*

Tests were performed in tank of 750L with initially 27 shrimps. All the treatments were done in triplicate. The non-toxicity of treatments has been verified firstly by contacting the different products to non-infected shrimps. Then, tanks were infected with a pathogenic strain of *Vibrio nigripulchritudo* ( $3.10^5$  cfu/ml during 3h at 29°C). Control allows observing the survival of shrimps in the absence of treatment. Results are showing in the following graph.

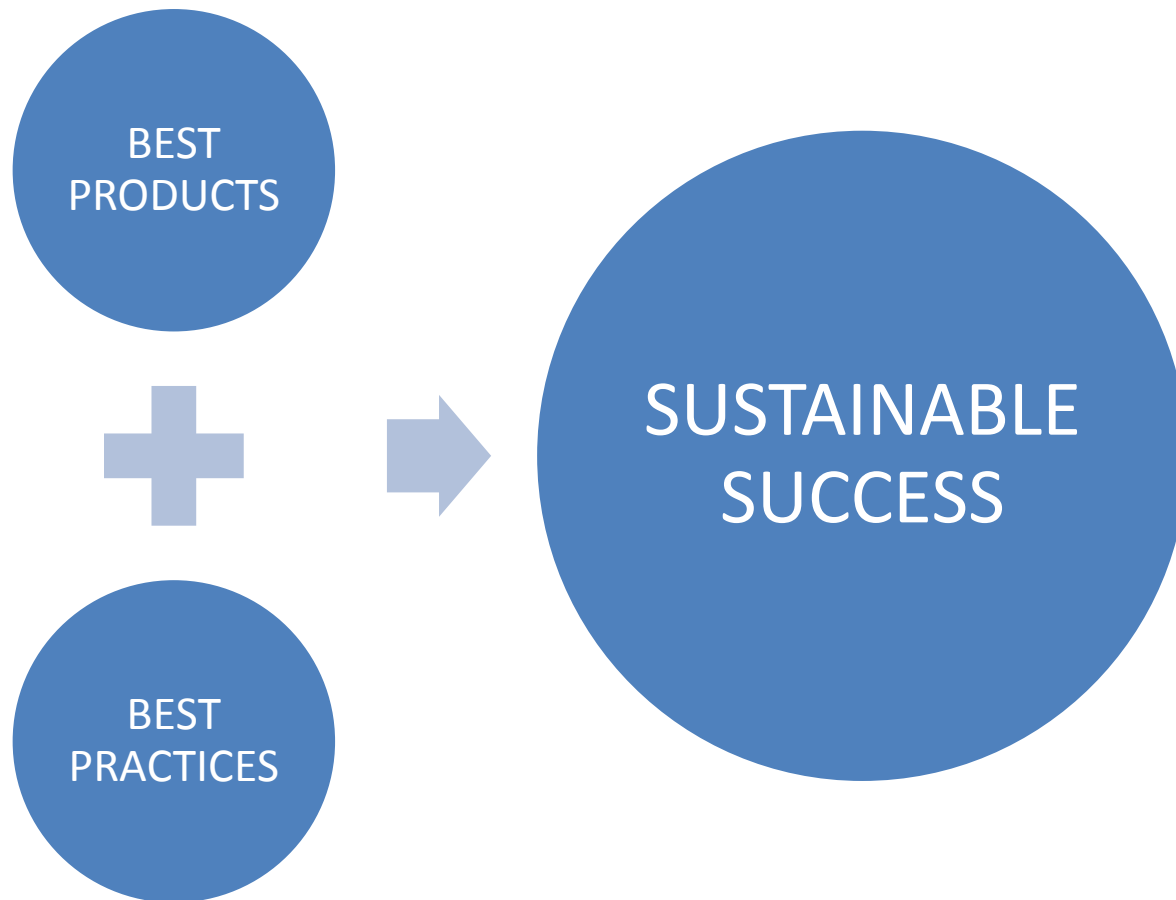


## CONCLUSION

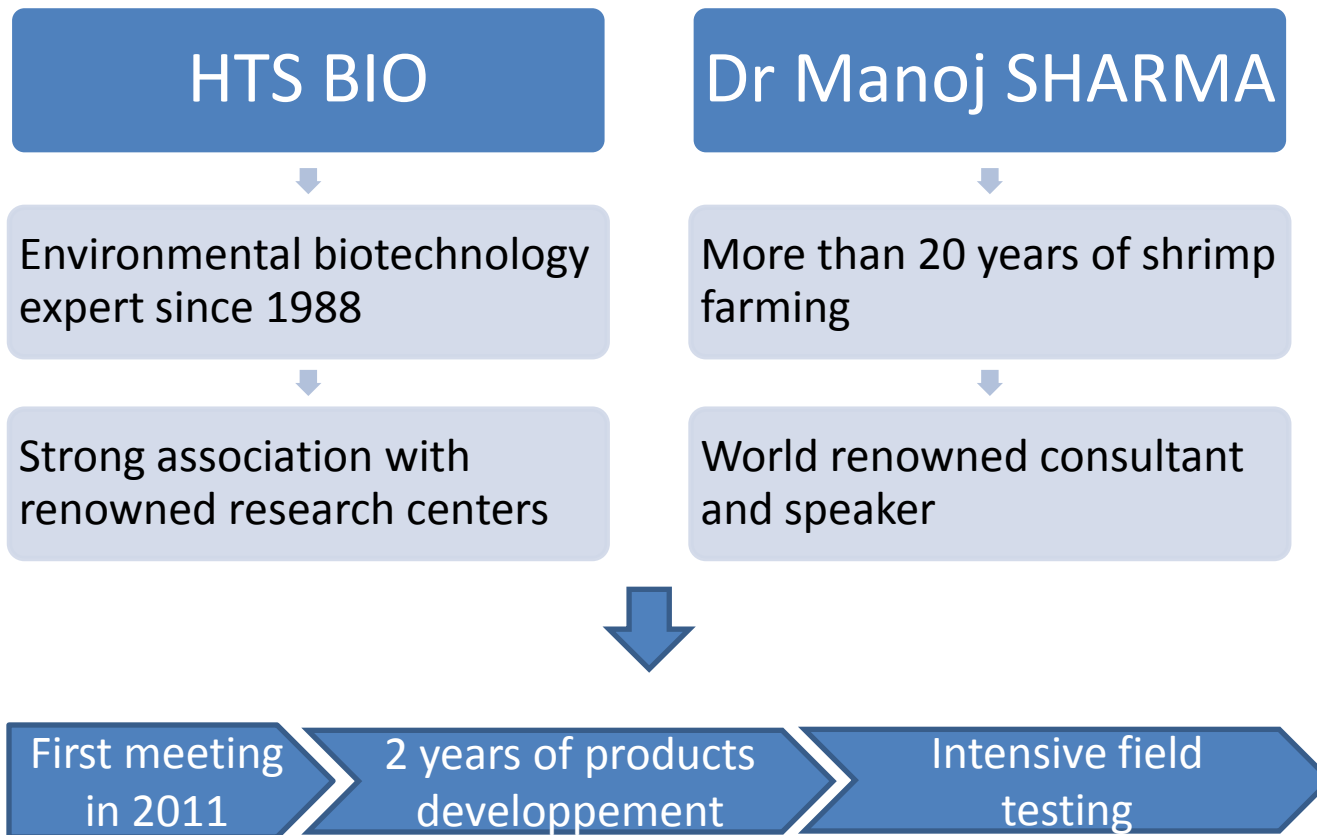
The results of this experiment show that Vivagrowth® used as feed probiotic has a positive impact on the ability of shrimps to resist at experimental infection with a highly pathogenic strain *Vibrio spp.*



## SUSTAINABLE SUCCESS



## Dr. SHARMA and HTS BIO joining forces



## SUCCESS RECIPE: 3 probiotic products for a complete treatment

### FEED



**VIVAGROWTH®**  
Feed probiotic  
to improve shrimp growth

### WATER



**VIVAPOND®**  
Biotreatment to improve pond water  
quality

### SOIL



**VIVASOIL®**  
Biotreatment to improve pond bottom  
quality

KHEILI MAMNOON!

Merci !

