



THE CRAWFORD FUND FOR FOOD SECURITY ANNUAL CONFERENCE

Emerging Voices Shaping Regional Integration for a Food Secure World

10-11 August 2026

Parliament House, Canberra,
Australia, and online



Genetics and Genomics of Giant Freshwater prawn (*Macrobrachium rosenbergii*)

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The Crawford Fund Conference 2026

I. OVERVIEW AND THE PROBLEM

Macrobrachium rosenbergii

- Widely distribution: Asia, Australia-Oceania, America
- High commercial value: US\$ 2.45billion (2021)
- Low production (high uniformity), slow growth, limited high-quality seed, diseases outbreak.

Genetically improve not only growth but also quality, behaviour and diseases resistance of species.

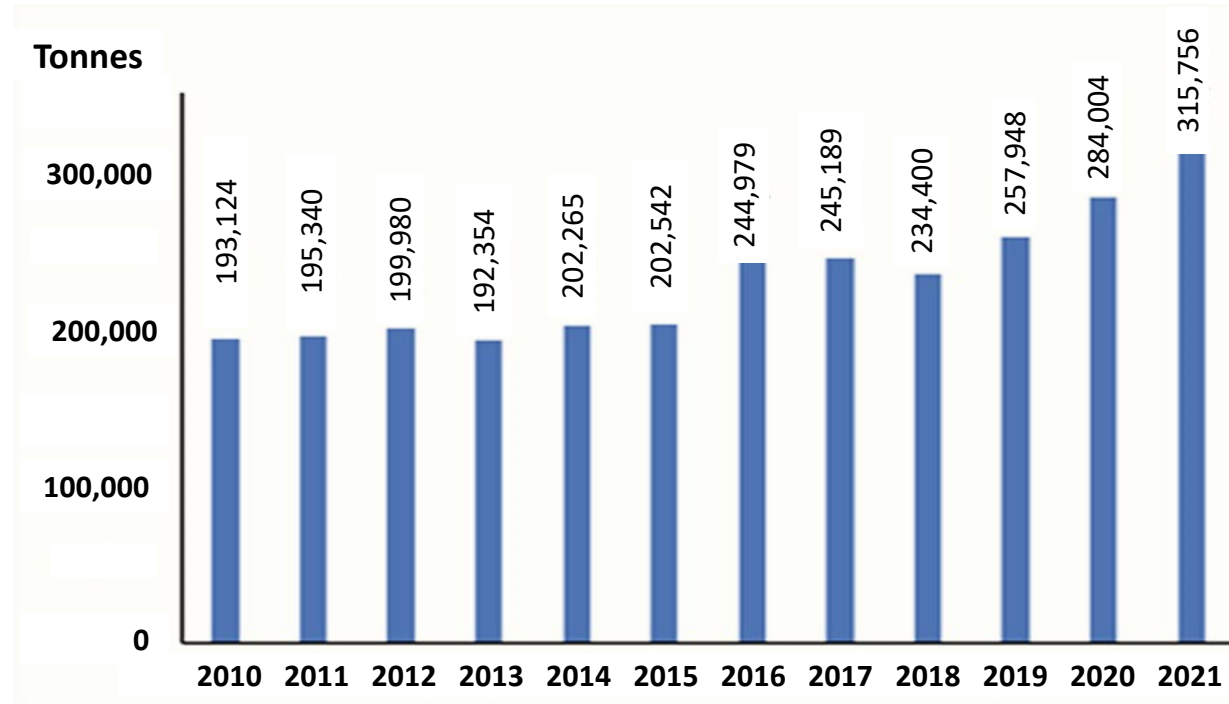


Figure 1: Global production of giant freshwater prawn from 2010 to 2021 (FAO, 2023)



II. MATERIALS AND METHODS

44 full-&61half-sibs family

Pedigree, phenotype, genotype

Genomic Prediction

Accuracy of genomic prediction for traits

Identify desirable individuals at an early age
Reduce unnecessary rearing time, feed use and resource losses for farmers.

Candidate genes

Identify candidate genes and SNPs associated to growth traits

Provide understanding about mechanism control phenotype expression.
Allows scientists to apply advanced techniques in selective breeding, improve food quality

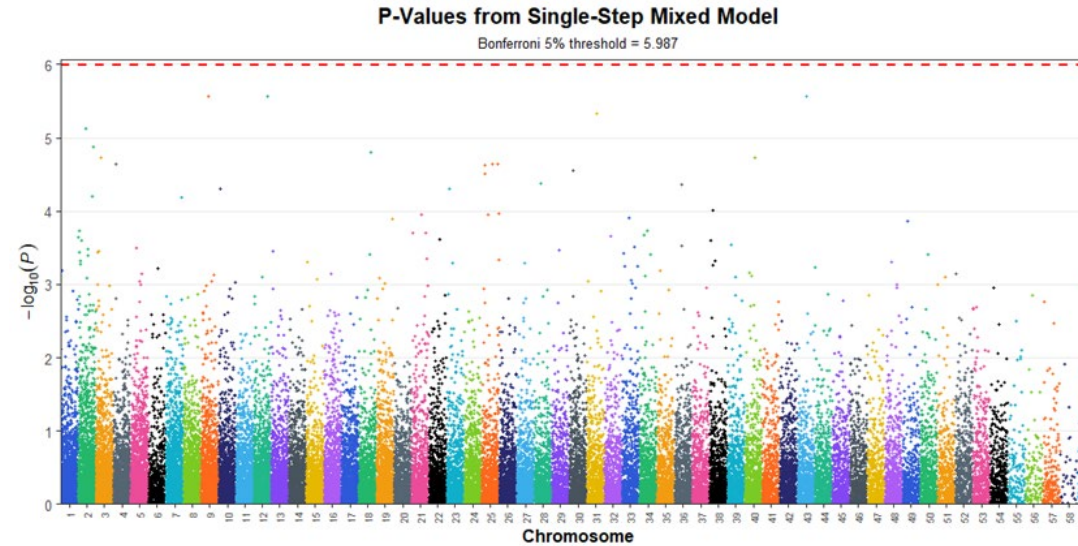
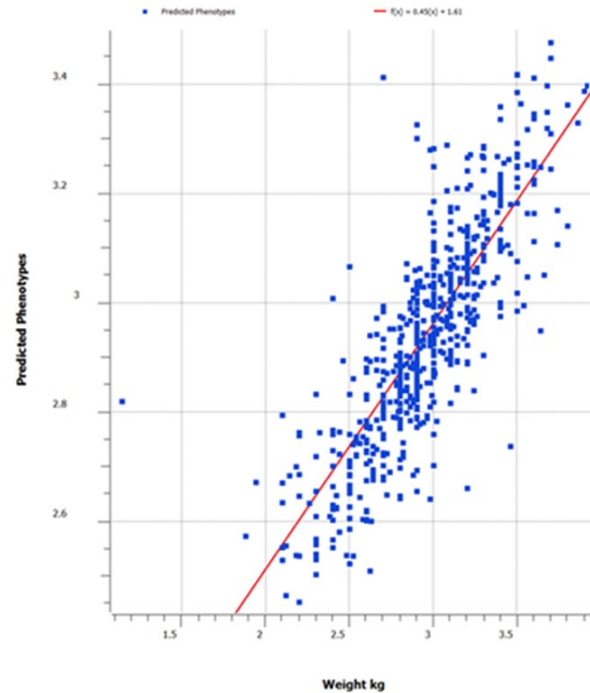
Develop SNP panel/array

Identify significant SNPs subsets

Provide a genetic tool for farmers and scientists.
Rapidly screen brood-stock, assign parentage, monitor genetic diversity, support for breeding.



III. RESULTS & IMPACT



EXAMPLE SNP PANEL (MICROCHIP)

WHAT IS IT?

A SNP microchip contains thousands to millions of SNP markers fixed on a solid surface. DNA samples are hybridized to the chip, and each spot represents a specific SNP.

HOW IT WORKS



EXAMPLE SNP PANEL SPECIFICATIONS

- Number of SNPs: ~700,000
- Genome coverage: Whole genome
- Applications: GWAS, Genomic selection, Population genetics, Genetic diversity
- Technology: Illumina Infinium / Affymetrix / Axiom



Using DNA information to identify better prawns earlier can help reduce production costs and support more reliable and sustainable aquaculture



Acknowledgement



- Centre for Bioinnovation (CBI)
- Research Training Program (RTP) scholarship
- Project staff at RIA2 (now VAFIS), Vietnam



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