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Regional Workshop on the "Status of Aquatic Genetic Resources (AqGR) in Asia-Pacific." March 23-26, 2015

FAO's Fisheries and Aquaculture Department & Network of Aquaculture Centres in Asia-Pacific (NACA)

- **The National focal points from fifteen countries in Asia and pacific;**

  Thailand, Cambodia, Lao PDR, Vietnam, Indonesia, Malaysia, Philippines, Myanmar, India, Pakistan, Nepal, IR Iran, Japan, South Korea and Fiji,

- **Experts Dr. Graham Mair (Australia), Dr. Tim Pickering (SPC), Dr. Clemens Fieseler (Germany),**

- **FAO, Dr. Devin Bartley, Dr. Halwart Matthias and Dr. Ruth Garcia Gomez (FAO consultant) and Dr. Miao Weimen, FAORAP.**

- The workshop suggested relevant changes and improvements to the questionnaire structure and contents and

Working groups

Synthesis about aquaculture scenario in Asia-pacific (based on table 1.1 provided by country delegates)

- A highly diversified aquaculture species in practice in different countries.
- It is encouraging to see in some countries for example Philippines, at least 9 strains of tilapia through improvement programs are finding use in farming.
- The trend of aquaculture production is increasing and more species are likely to come in ambit of production system.
- Aquaculture production depends upon many exotic species. With this trend, transboundary movement of species will increase to enhance the production to meet the food requirement.
- The selective breeding programs for close to 10 species are progressing in different countries and need for dissemination and upscaling of some of these improved varieties and germplasm exchange strategies will arise.
- Wild relatives are important, not only to support capture fishery but as source of genetic variation for aquaculture. Knowledge of their genetic characteristics and production performance diversity

Rcommendations

- Encourage documentation of genetic stocks and production performance of wild relatives of native cultivable species.
- Strengthen regional linkages to bridge wide gap in the capacity to implement aquatic genetic resource management and application of modern tools, among Asia-pacific countries .
- Strengthen Genetic improvement within the aquaculture sector.
- Strategic plans for dissemination of available genetically improved varieties between.
- **Regional networks to facilitate and providing collaborative framework for exchange of germplasm between countries.**
- Need for evaluation based procedures for decision making prior to introduction of non-native germplasm in the country.
- Seed quality : a concern for sustainable intensification of aquaculture. Need for management of farmed AqGR's to improve genetic fitness of seed for aquaculture resilience and prevention of diseases.
- Linkage between *SoWAqGR* information and existing databases to update information systems on aquatic genetic resources used at national, sub-regional and regional level.

Special Session on
Status of Aquatic Genetic Resources for Food & Agriculture

During the ASEAN Fisheries and Aquaculture Conference & Exposition 2016 & the 11th Asian Fisheries and Aquaculture Forum Bangkok International Trade and Exhibition Centre, Bangkok (Thailand), 5 August 2016

to bring together experts & delegates from various Asian & Pacific countries to present their national experiences.

to present in detail the actions being implemented by FAO and NACA.

Network of Aquaculture Centers in Asia-Pacific

An Intergovernmental Network of 19 countries

Networking Professionals

- **Thematic Working Programs**
  - Sustainable Farming Systems
  - Aquatic Animal Health
  - Food Safety, Quality and Certification
  - Genetics and Biodiversity
  - Response to Climate Change
- **Cross-Cutting Programs**
  - Education and Training
  - Information and Communications
  - Gender Integration
- **Joint R&D projects**

NACA Program:
Genetically Responsible Aquaculture

1. Traceable Aquaculture Genetic Systems (TAGS)

2. Emergency Rapid Appraisal (ERA) of current farm-level inbreeding and regional genetic diversity

3. Disease Mitigation with Genetic Fitness and Pathogen Control

4. National Broodstock Improvement Network (NBIN).

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New Lessons Emerging

Genetic Erosion & Inbreeding

- Threat to Sustainability
  - Quality input – Seeds
  - Genetic fitness
  - Disease & pathogen susceptibility
  - Lower production performance

Vulnerable Groups

- Genetically improved
- Introduced with Low Founder Base

Diseases: Racing against pathogens

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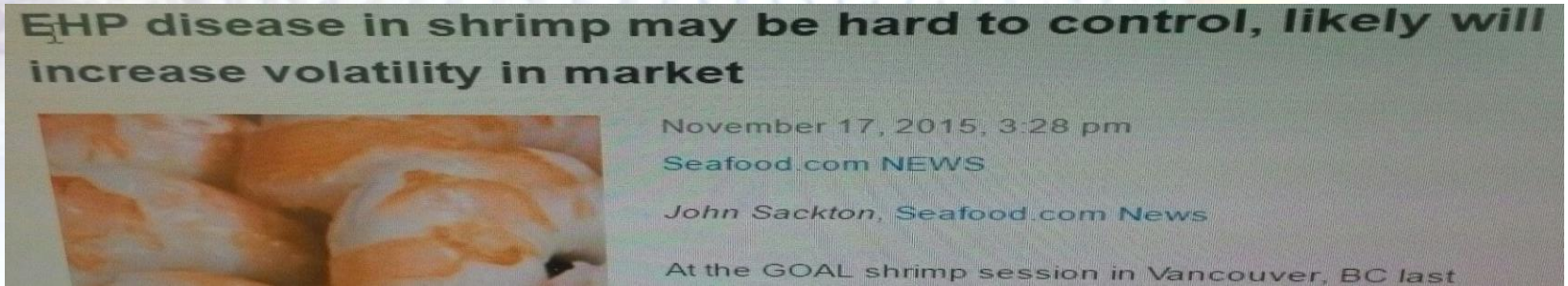
- Unpredictable & New Emerging
  - Pathogens out of culture environment
  - Example : Fungal & parasitic pathogens 2-3% (Flegel 2006) now concern like EHP


EHP disease in shrimp may be hard to control, likely will increase volatility in market

November 17, 2015, 3:28 pm

Seafood.com NEWS

John Sackton, Seafood.com News

At the GOAL shrimp session in Vancouver, BC last

New Lessons Emerging

Up to 40% of tropical shrimp production (>$3bn) is lost annually
(Equivalent to the combined import of USA and EU)

Mainly due to pathogens for which standard preventative measures (e.g. such as vaccination) are not feasible.

Require

- **New approaches to enhance yield by improving broodstock and larval sourcing**
- **Promoting best management practices by farmer outreach**
- **Research that aims to harness the natural abilities of invertebrates to mitigate assault from pathogens**

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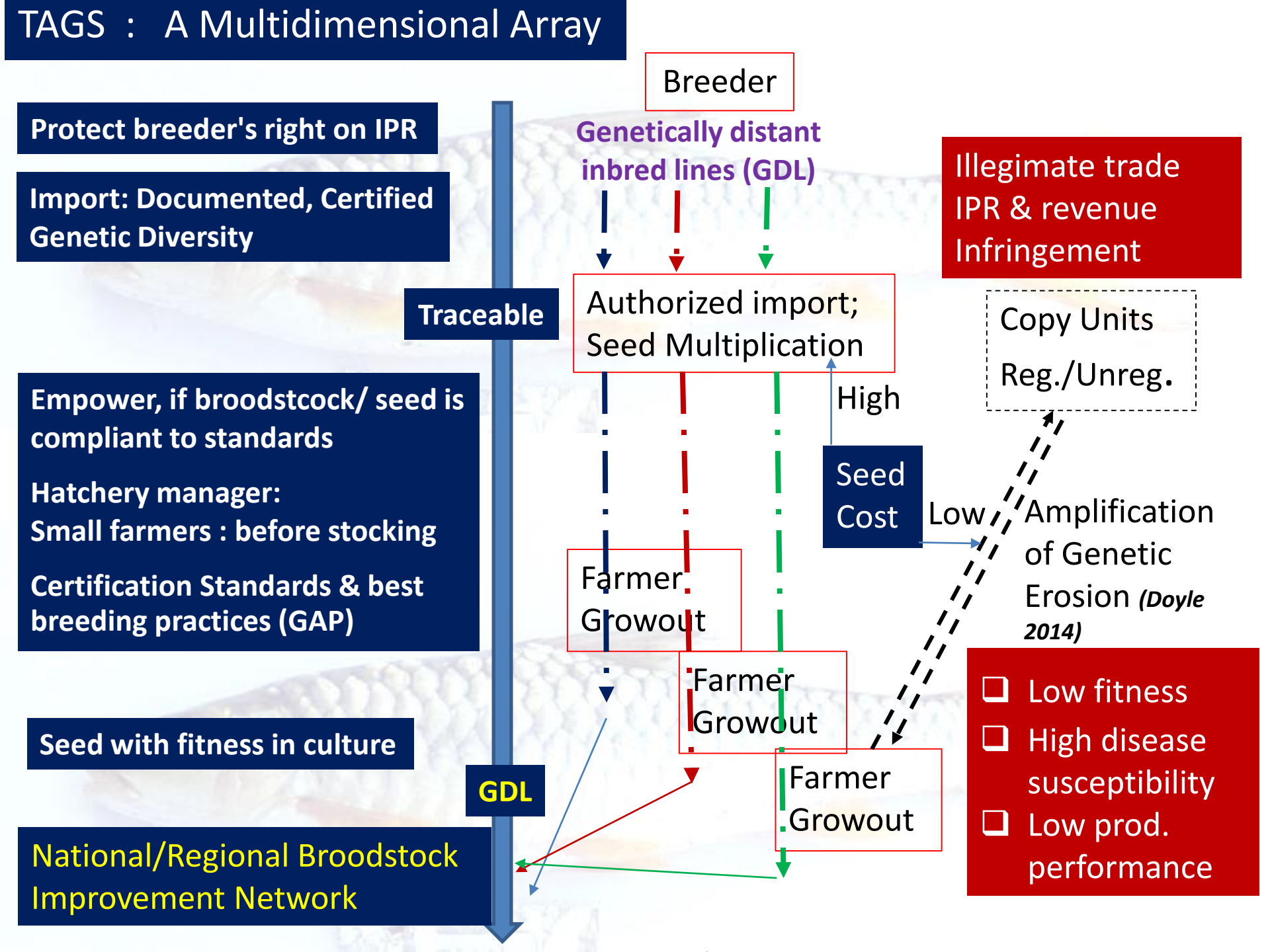
Stentiford et. al. 2012

TAGS : A Multidimensional Array



Thank You

Way forward in Aquaculture

Need to aim for

- Increase productivity : Produce more from less
  - Improved varieties (to raise use from meagre 8.2%)
  - Sustained genetic diversity during domestication
  - Efficient husbandry systems
  - Minimum disease risk

- Adhere to GAPs and certification norms
- Minimal impact on biodiversity

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- Compliance to International Policy Frameworks & conventions
- Uphold rights of native communities

Unparallel Expansion of an Alien

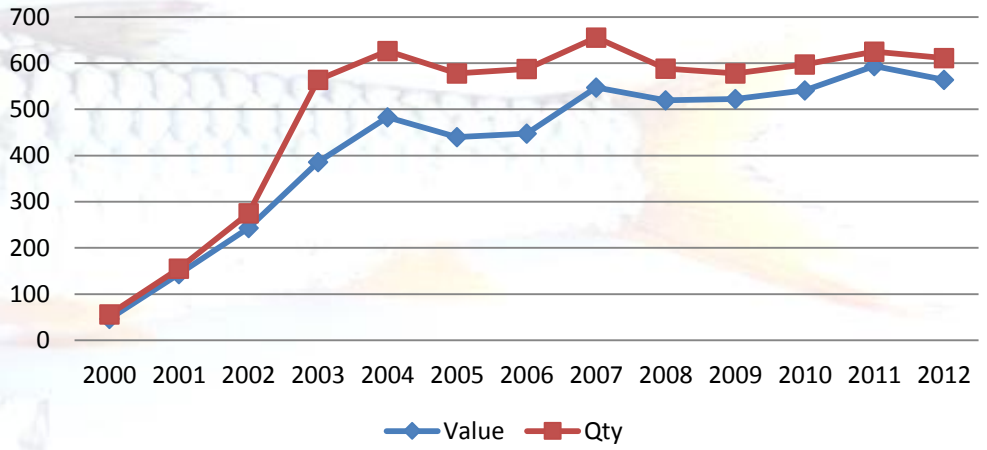
Litopenaeus vannamei

Since 2004, Alien sources producing over 400% to native production

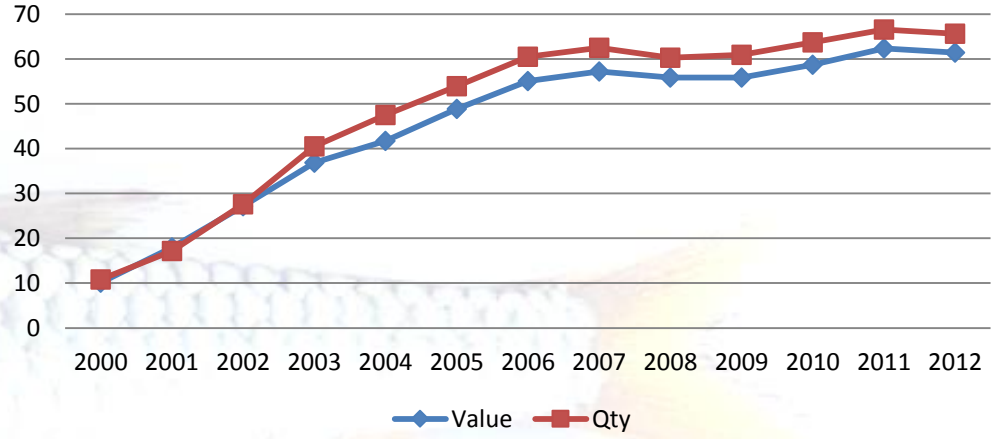
Introduced regions (29) Contributed 85% to the global prod rest from native locality (15).

>70% of total shrimp prod.

***L. vannamai* : Alien/native production**



***L. vannamai*/Total Shrimp**

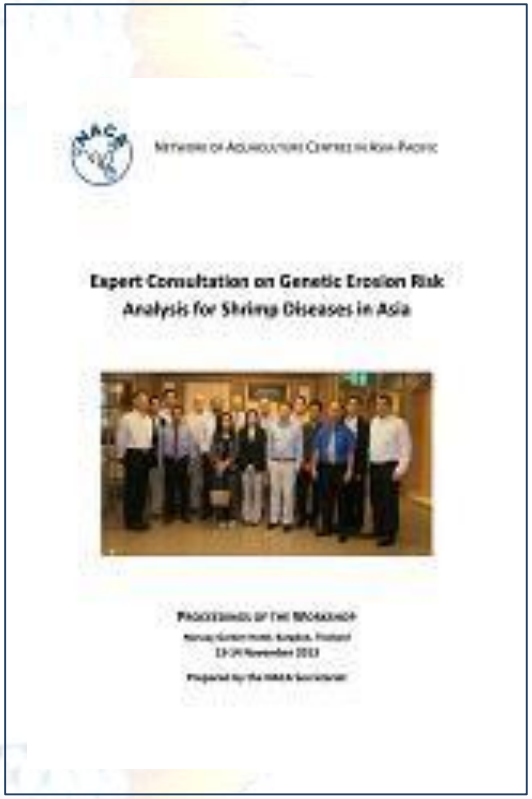


Improved breeds : Tradability
GERMPLASM TRANSFERS

New Lessons Emerging

Expert Consultation on Genetic Erosion Risk Analysis for Shrimp Diseases in Asia; 13-14 November 2013

- **first time linked: Genetic erosion due to unauthorized seed production in shrimp, as responsible factor for high disease susceptibility.**



Need for A verifiable certification program

Standard protocols for testing genetic signatures of locking & copying.

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a group from diverse fields – **epidemiology, microbiology, disease diagnostics & surveillance, aquaculture genetics, fish breeding, & evolutionary biology**

New Lessons Emerging

Broodstock Trade

2015 : Hawaii shrimp breeders exported 800,000 animals. (Upward 32% over 2014).

Worth $40 million. Most Asia (China 37% & Indonesia 24%).

a major success story for Hawaii and USA aquaculture.

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50% of global farmed shrimp production is derived from Hawaii broodstock.

(26000 Million USD Over 5 M tons 2014)

TAGS : Why We Need Today

Genetic management *vis a vis* certification and standards----- ??

- **FAO Technical Guidelines on Aquaculture Certification (2011)**

In principal

- **Aimed to promote responsible aquaculture in accordance to FAO Code of Conduct for Responsible Fisheries (CCRF) Article 9.**

Article 9.3 : need for genetic planning in broodstock management to alleviate the negative effect of inbreeding and production of quality seed for aquaculture.

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The very important missing link

- Lack of any field validated assay protocol and standards to test.
  - genetic composition and inbreeding

Traceable Aquaculture Genetic Systems

A system for genetic management of seed production

- **novel easy to assay tools & standards**
- policies & procedures

To enhance aquaculture security & trade

Certify origin & genetic composition of broodstock & seed

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A Concept

TAGS : Why We Need Today

Genetic Improved Variety (Productive Disease resistant) – Germplasm Transfers

Issues limiting the transfers/Germplasm exchange

Biological protection - Continuously improvement & Pedigree data : Risk loosing Genetic Gains

IPR protection & Investment protection

Material transfer agreement (MTA) & Passport Information

Origin - Verification by DNA-markers

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TAGS :
Looking for Paradigm Shift Seed Production System

TAGS : Looking to Basics

The rate of increase in fitness of any organism at any time is equal to its genetic variance in fitness at that time
Fisher's fundamental theorem

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Sustain Fitness to sustain Aquaculture Production

Thank You