

# AQUA CULTURE

A s i a P a c i f i c

**B**arramundi in Thailand

**F**arming shrimp with  
probiotics in India

**S**queezed from both sides  
for aqua feeds in Asia

**M**arine shrimp in Asia in 2012

**S**ustainable tilapia in  
Hainan Island

**S**hrimp in Ecuador





Harvest of barramundi, p15

**2 From the editor**  
Staying optimistic in 2013

**4 News**  
**Tilapia connection in Hainan**  
Industry forum reviews production and marketing

**6 News in brief**

## Shrimp Culture

**8 A farmer's perspective on probiotics in shrimp culture**  
Manoj M. Sharma provides more clarity and information to farmers

**13 Update on top disease threats for shrimp cultured in Asia**

Dr Tim Flegel gave several messages on EMS/AHPNS in a presentation at the DSM Aquaculture Conference Asia Pacific in November 2012

## Fish Culture

**15 Driving barramundi in Thailand**  
Revival of barramundi farming in freshwater ponds. By Zuridah Merican

## Aqua Feeds in Asia

**18 Squeezed from both sides**  
Annual review shows higher volumes of fish feeds and a second difficult year running for some shrimp feed producers

**26 Value adding in marketing feed**  
Tycos Vos says Gold Coin's new aqua business team will shift from generic feed marketing to value added services

## Industry Review

**28 Shrimp production in Asia in 2012**  
Low supplies continued into 2012 amidst grim outlook with rising costs. AAP reports

## Feed Technology

**33 Improving growth performances of tra catfish cultured in earthen ponds**  
Inclusion of a natural feed additive in feeds showed better growth and health of juvenile pangasius. By Nguyen Nhu Tri and Le Thanh Hung

**35 New diets counter high temperatures**  
Management of Atlantic salmon through warm summers in Australia

**37 Drivers for production gains: Better nutrition and health**  
At the DSM Aquaculture Conference Asia Pacific, experts looked at enzymes, gaps in nutrient requirements for vannamei shrimp, lipids and macro and micronutrients in fish nutrition and health

## Developments

**42 Key factors in shrimp production in Ecuador**  
Pablo Intriago explains Ecuador's annual increase in production since 2003.

**44 *Gaulerpa* culture in South Sulawesi**  
Nana S.S.U. Putra, Imran Lapong, Michael A. Rimmer and Sugeng Raharjo show this as a profitable diversification from shrimp farming

## Marketing

**46 The impact of the EU crisis on South East Asian seafood trade**  
Despite the crisis, the EU continues to be a very attractive market for seafood exporters, says José Fernández-Polanco

**47 China Fisheries and Seafood Expo 2012**  
In Dalian, an interactive platform for Asia's seafood business

**51 A zone management approach for sustainable aquaculture**  
This starts with SFP's Aquaculture Improvement Project with the tilapia industry in Hainan Island

## Show Preview

**54 Aquatic Asia 2013 in Bangkok, Thailand**

## Company News

**57 Monosex culture of prawns**

## Events

**58 TARS 2013: Finfish Aquaculture-Industrialisation and Sustainability, Singapore**

**59 2013 Hinter Symposium, Zhanjiang, China**

**60 10AFAF and CAA4, Yeosu, Korea**

### Editor/Publisher

**Zuridah Merican, PhD**  
Tel: +603 2096 2275 Fax: +603 2096 2276  
Email: zuridah@aquaaasiapac.com

### Editorial Coordination

**Corporate Media Services P L**  
Tel: +65 6327 8825/6327 8824  
Fax: +65 6223 7314  
Email: irene@corpmediapl.com  
Web: www.corpmediapl.com

### Design and Layout

**Words Worth Media Management Pte Ltd**  
Email: sales@wordsworth.com.sg  
Web: www.wordsworth.com.sg

AQUA Culture AsiaPacific is published bimonthly by **Aqua Research Pte Ltd**



3 Pickering Street, #02-36 Nankin Row,  
China Square Central, Singapore 048660  
Web: www.aquaaasiapac.com  
Tel: +65 9151 2420 Fax: +65 6223 7314

Printed in Singapore by  
Overseas Supplies Pte Ltd  
6 Jalan Lembah Kallang, Singapore 339562

### Editorial and advertising enquiries

Email: zuridah@aquaaasiapac.com  
Tel: +603 2096 2275 Fax: +603 2096 2276

### Subscriptions

Subscribe via the website at [www.aquaaasiapac.com](http://www.aquaaasiapac.com) or complete the enclosed form and mail with payment. Subscriptions can begin at any time. Subscriptions rate/year (6 issues): Asia SGD 70, Other zones: SGD 100  
Email: [subscribe@aquaaasiapac.com](mailto:subscribe@aquaaasiapac.com)  
Tel: +65 9151 2420 Fax: +65 6223 7314

Copyright © 2013 Aqua Research Pte Ltd.  
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owners.

# Monosex culture of prawns

## Androgenic gene silencing and a fast growing all maleline

Work conducted by Dr Amir Sagi, professor in the Department of Life Sciences and the National Institute for Biotechnology in the Negev, Ben-Gurion University of the Negev, Israel is now available to *Macrobrachium rosenbergii* commercial farms in Asia. Below, Sagi discusses developments in the industry and the role of this novel technology.

### Sexual bimodal growth

In many crustacean species, a sexual bimodal growth pattern is exhibited where females grow larger than males of the species or vice versa. In several cultured species such as the Australian red-claw crayfish *Cherax quadricarinatus* and the giant freshwater prawn *M. rosenbergii*, males grow faster and reach higher weights than females. Thus, an all-male monosex population culture of the species is desirable.

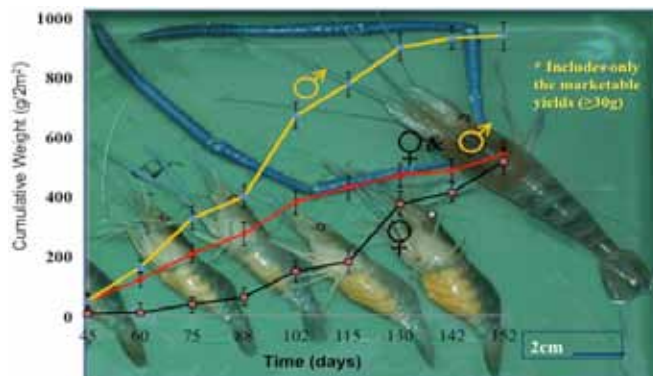
*M. rosenbergii* is native to the tropical Indo-Pacific region of the world and is an economically important crop in China, India, Vietnam and many other Asian countries. It has high demand as a food item and as an export product. The reduction of wild stocks has resulted in a gradual increase in the volume of traditional prawn culture production up to 2009. China, India and Vietnam together produced more than 200,000 tonnes annually valued at USD 2.4 billion (FAO 2009). Bangladesh, Thailand and other countries produced smaller amounts. However a decrease in culture during recent years calls for the introduction of advanced technologies to increase yields.

### Monosex culture

Differences between males and females of the same cultured species, in growth rate, alimentary needs and behavioural patterns, dictate the need to establish management procedures specifically adjusted to one sex or the other. Moreover, since a monosex culture population is inherently non-breeding, energy is diverted to growth. Reproduction can be carried out in such systems under separate, controlled conditions. The monosex culture strategy has become a common practice in fish culture and attempts have been made to apply it to crustacean culture.

A small scale experiment conducted as early as 1986 in Israel in hapa nets by hand segregating *M. rosenbergii* monosex populations resulted with significantly higher yields when all-male populations were cultured. More recently (India, 2006), an economic analysis of all-male population culture showed income increase by ~60% over mixed and all-female populations, taking into account the expenses under Indian conditions, caused by labour-intensive hand segregation and related losses (Figure 1).

Figure 1. *M. rosenbergii* dimorphic growth in favour of all male culture and selective harvest\* (modified from Sagi et al, 1986).



### Sex reversal

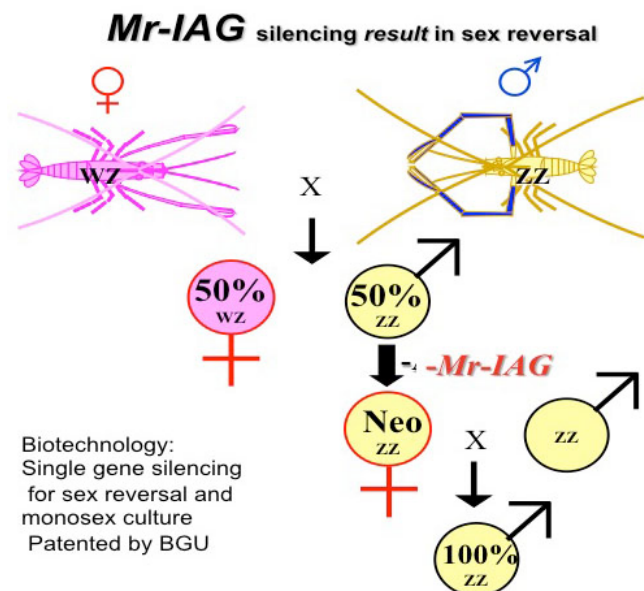
In *M. rosenbergii* a fully functional sex reversal could be achieved by microsurgical manipulation of the androgenic gland (AG) in early post-larval males. Although AG manipulation dates back half a century, a biotechnological approach for the generation of all-male populations was only recently devised, and it involves the microsurgical removal of the AG from juvenile males. AG removal from immature males results in sex reversal. Since *M. rosenbergii* males are the homogametic sex, bearing two homologous sex chromosomes (ZZ) as in several other studied crayfish and shrimp species, sex-reversed males produce 100% male progeny. Indeed, we found that sex-reversed animals (neo-female) are capable of mating with normal males to produce an all-male offspring population. This population may result in an increase in yield since females at the end of a culture season may weigh 26–45 g, while males may reach up to 100–120 g. This biotechnology has been implemented in Vietnam, Thailand and India.

### The novel technology: Gene silencing and the BGU line

The gene silencing technology was developed at the National Institute of Biotechnology at Ben Gurion University of the Negev (BGU). It is based on a recent finding of a new gene encoding an insulin-like androgenic gland hormone from *M. rosenbergii* (termed Mr-IAG and fully patented).

The patent is licensed to Tiran Shipping (1997) Ltd with exclusive, worldwide rights to utilise the IP and to commercialise the licensed products. Silencing of this gene could cause complete sex reversal of a male into a functional neo-female. The technology includes the application of gene silencing in males of the fast growing BGU line of *M. rosenbergii*. Via the use of specific molecular sex markers, the identified males are transformed through a temporal single gene silencing into neo-females.

The neo-females are grown and bred to produce all-male populations (see chart). The technology does not use hormones or chemicals and it is not producing genetically modified prawns. Thus this is a completely non-GMO technology. Because it does not involve genetic modification of the organism, thereby bypassing the regulatory pipeline required of genetically-modified crops, this is a boon for monosex biotechnology. As the intervention is temporal, it is not transmissible to next generations. Indeed, this approach may be of tremendous merit in the aquaculture industry. Moreover, it could also form part of a sustainable solution for the management of invasive and/or pest crustacean species, where the production of non-reproducing male or female populations is sought.



More information: web: [www.tiran.co.il](http://www.tiran.co.il); Email: [havioz@tiran.co.il](mailto:havioz@tiran.co.il) (Haim Avioz, managing partner, Tiran Group); [sagia@bgu.ac.il](mailto:sagia@bgu.ac.il) (Dr Amir Sagi)