



Message from Editor



Congratulations to the new Executive Committee of Fish Health Section (FHS) that has been elected for the period 2015-2017 and wish that the network under their guidance will do better than ever for the health of aquaculture sector.

During the period under report, Asian Fisheries Society in collaboration with Shanghai Ocean University has successfully organised the "2nd International Symposium on Aquaculture and Fisheries Education (ISAFE2)" on 22-24 April 2015 in Shanghai, China and was well attended.

Arrangements are in full swing for the organisation of 5th International Symposium on Cage Aquaculture in Asia (CAA5) scheduled for 25-28 November 2015 in Kochi, India, organised by the Asian Fisheries Society in collaboration with the ICAR- Central Marine Fisheries Research Institute, Kochi, India and Asian Fisheries Society Indian branch.

Asia-Pacific FishWatch has made considerable progress in completing the profiles of four main oceanic tuna species (skipjack, yellowfin, bigeye and albacore tuna), which are among the top species in the region in terms of production and value and are significant global species.

The newsletter also provides a list of conferences/symposia to take place in the next 12 months, important publications that have come out in 2015 and some major news items.

I look forward to Members' contributions to the newsletter.

M. V. Gupta

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President's Message



The 2nd International Symposium on Aquaculture and Fisheries Education (ISAFE2) was successfully organized by Asian Fisheries Society (AFS) and Shanghai Ocean University (SHOU) on SHOU campus in Shanghai during 22nd to 24th April, 2015. I wish to take this opportunity to acknowledge my sincere thanks to ISAFE2 supporters, SHOU staff, AFS CAG members and AFS Councillors who have contributed to the successful organisation of the symposium. About 90 participants from 15 countries and regions attended the symposium and 81 articles were included in ISAFE2 Book of Abstracts. Three keynote speeches were delivered: (i) 'Globalizing Fisheries and International Linkage in its Education' by Prof. Tatsuro Matsuoka, (ii) 'Experiences from AQUA-TNET (EU Thematic Network for Lifelong Learning in Aquaculture, Fisheries & Aquatic Resources Management)' by Prof. John Bostock and (iii) 'Development Trends of Chinese Fisheries Education in Light of the Development of the Industry' by myself. Also 8 country reports summarising the current status of aquaculture and fisheries education in Asian and European countries were presented. Three special sessions were also convened during ISAFE2 and these sessions allowed a more in depth understanding of status and trends in non-formal education, south-south cooperation, linkages in fisheries education, etc. I would like to express my sincere thanks to the three chairs, Dr Matthias Halwart, Prof. Tatsuro Matsuoka and Dr Baskaran Manimaran for their great contribution.

The symposium provided an opportunity once again to bring educators, students and training agencies from across the aquaculture and fisheries teaching institutions, industries and education regulatory agencies together, and resulted in discussions and achievements in many critical issues, such as curriculum development, teaching methods innovation, partnerships in training between Stakeholders and academic sectors and future direction and strategy on aquaculture and fisheries education. The Director General of Network of Aquaculture Centres in Asia-Pacific, Dr Cherdasak Virapat wrote to the ISAFE2 organizing committee saying that ' There were many issues discussed and implemented that will benefit society such as establishment of network of universities/teachers in fisheries and aquaculture'.



Professor Shuolin Huang

President of AFS

AsiaPacific-FishWatch Breaks Information Barriers

Progress has been made in completing the species profiles for the four main oceanic tuna species (skipjack, yellowfin, bigeye and albacore tuna), with only a few more sections to be completed (see <http://www.asiapacfish.org/index.php/species>). These species are among the top species in the region in terms of production and value and are significant global species. The oceanic tuna profiles have been challenging to compile as these species are under the spotlight in terms of their geopolitical importance, the high interest in them from global conservation groups, and the complexity of their biology, markets and fisheries. Nevertheless, we have had good collaboration from peer reviewers in the regional fisheries management and scientific agencies (especially the Secretariat for the Pacific Community and the Indian Ocean Tuna Commission, among others).

A quick guide to where the information on these tuna resides on the web can be found at: <http://www.asiapacfish.org/index.php/item/24-tracking-down-expert-knowledge-on-oceanic-tunas>

Thanks to a new grant from the International Seafood Sustainability Foundation (<http://www.iss-foundation.org/>), we are now able to also prepare the profile for longtail tuna. If you are involved with research or management of this species (*Thunnus tonggol*) please contact us at asiapacific.fishwatch@gmail.com to see how to become involved.

Here are three highlights you may not have known before from the oceanic tuna profiles.

- The four species differ greatly in the size of their swim bladders, and important characteristics that the scientists are starting to use more and more in acoustic research and fishing to distinguish which species may be present, for example, around fish aggregating devices. Skipjack has no swim bladder; the order of proportional size of swim bladder, from smallest to largest, is yellowfin, albacore and bigeye tuna.
- Juvenile yellowfin and bigeye tuna are difficult to tell apart in the catch.
- Many people around the world mainly know skipjack tuna from its canned form. In the Indian Ocean and Western and Central Pacific region, including Asia, however, skipjack tuna are a favourite local food and prepared in many different ways. These include: in dashi (Japanese fish stock), cakalang fufu (cured and smoked in northern Sulawesi), and as masroshi (fish snack with dried skipjack in Maldives).

Your pictures and stories about the ways in which any of the tuna are used locally are most welcome!

Contributed by Meryl J Williams

GENDER IN AQUACULTURE AND FISHERIES UPDATE

6th Global Symposium on Gender in Aquaculture and Fisheries during IIAFAF

The gender in aquaculture and fisheries group within the Asian Fisheries Society is planning its 6th symposium to be held during the 11th Asian Fisheries and Aquaculture Forum in Bangkok, 3-7 August 2016. This symposium will build on the previous work of this group. The Organizing Committee is now being formed and will be announced shortly.

In the meantime, the editorial group (Nikita Gopal, Meryl Williams, Marilyn Porter, Kyoko Kusakabe and Rashidah Shuib) is working with authors and reviewers to bring to publication selected papers from the GAF5 Global Symposium held in Lucknow last November, and reported in the last AFS Newsletter (December 2014). This will be published in the Asian Fisheries Science journal.

The group is also working on a number of improvements to our website, <http://genderaquafish.org/>, with a view to making the thematic information it contains more accessible.

LINKS

Website: <http://genderaquafish.org/>

Facebook: <https://www.facebook.com/pages/AFS-Gender-in-Aquaculture-and-Fisheries/18117655231544>

Twitter: @Genderaquafish <https://twitter.com/Genderaquafish>

Paper.li: Genderaquafish <http://paper.li/f-1343620155>

Google Group: <https://groups.google.com/forum/#!forum/genderaquafish>

Contributed by: Nikita Gopal and Meryl J Williams

FISH HEALTH SECTION

9th Symposium On Diseases in Asian Aquaculture (DAA9)

The DAA9 was successfully held on 24-28 November 2014 in Ho Chi Minh City, Vietnam. It was hosted and organized by the Department of Animal Health, Ministry of Agriculture and Rural Development, Vietnam, with the local Organizing Committee headed by Dr. Nguyen Van Long. The meeting was attended by 356 participants from 33 countries around the world. There were 99 oral presentations and around 150 poster presentations. Various topics on aquatic animal health and other relevant issues were discussed during the symposium, under the following sessions:

- Biosecurity and compliance
- Parasitic diseases
- Shrimp EMS/AHPND (Early Mortality Syndrome/Acute Hepatopacreatic Necrosis Disease)
- Fish viral diseases
- Shrimp WSD (White spot disease)
- Fish immunology
- Tilapia and Catfish diseases
- Shrimp immunology
- Marine and other aquatic diseases
- Diagnostics
- Husbandry and management.

The FHS, through the leadership of Dr. CV Mohan and in coordination with Dr. Yoshinaga has negotiated with the Fish Pathology journal of the Japanese Society of Fish Pathology to publish a special issue for the DAA9 Proceedings covering selected and peer-reviewed papers which were presented (either oral or poster) during the symposium. The special issue is scheduled to be published within this year or early 2016. Dr. Mohan and Dr. Eduardo Leañó will serve as guest editors for the journal on this special issue.

New Executive Committee (FHS)

In conjunction with the DAA9, the 10th TGM of AFS-FHS was held on 26th November 2015 and selected the 2015-2017 Executive Committee officers and members as follows:

Chairperson: Dr. Phan Thi Van (Vietnam)

Vice-Chairperson: Dr. Agus Sunarto (Indonesia/Australia)

Secretary/Treasurer: Dr. Eduardo Leaña (Philippines/Thailand)

Members:

1. Prof. CV Mohan (Past Chair; India/Malaysia)
2. Dr. Le Van Khoa (Vietnam)
3. Dr. Susan Gibson-Kueh (Singapore/Australia)
4. Dr. Pravata K. Pradhan (India)
5. Dr. Motohiko Sano (Japan)
6. Dr. Puttharat Baoprasertkul (Thailand)
7. Dr. Jie Huang (China)
8. Dr. Darshanee Ruwandeepika (Sri Lanka)

Observers:

1. Dr. Han-Ching Wang (Taiwan)
2. Dr. Riji John (India)
3. Dr. Ei Lin Ooi (Singapore/Thailand)
4. Dr. Beng Chu Kua (Malaysia)
5. Dr. Joselito Somga (Philippines)

First Meeting of the 2015-2017 ExeCom

FHS Chair, Dr. Van, presided over the meeting and it was agreed that the DAA10 will be held in Bali, Indonesia (venue of the first DAA in 1990) in November 2017 (dates and venue to be decided). For the FHS Newsletter, Dr. Susan Kueh agreed to continue as the Editor with support from Dr. Pradhan.

Other Matters

During AFS membership drive during the DAA9, a total of US\$ 4,100 was collected towards membership renewals, new members and reactivation of membership.

NEWS FROM AFS SECRETARIAT

AFS meeting at Shanghai: The 46th Council Meeting was held on 21st April 2015 at Shanghai Ocean University, China, in conjunction with ISAFE2.

AFS Strategic Plan: On 22nd April 2015, a short workshop on AFS Strategic Plan was held at Shanghai Ocean University, China. The workshop looked at the Vision, objectives and goals of the Society. The revised AFS Strategic Plan will be discussed in the next Council Meeting.

Appointment of a new Executive Officer (EO): The new EO for AFS is Ms Malathi D/O Thanamsegaram. She is replacing Ms Jocyntha Joseph who has resigned for undertaking further studies. AFS Council would like to thank Ms Jocyntha Joseph for her contribution to the society and wish her success in her career.

Appointment of a new Vice-President: Following the resignation of Prof. Dr. Neil Loneragan as Vice President, the Council appointed Dr. Alice Joan Ferrer as new Vice President until the coming AFS General Assembly.

Membership Account: New features of membership account was launched. Secretariat will send notices to all members to update their details. Please use the below password to login and you can also change to new password yourself.

Username: ID Number

Password: afs@123

47th Council Meeting: Scheduled for 22 - 26 February, 2016 in Bangkok.

UPCOMING CONFERENCES ORGANISED BY AFS & BRANCHES/NETWORKS

5th INTERNATIONAL SYMPOSIUM ON CAGE AQUACULTURE IN ASIA – CAA5

Asian Fisheries Society (AFS) has been providing major platform for the various stakeholders to interact and discuss issues, trends and the future of cage aquaculture in the region and beyond ever since the first symposium on Cage Aquaculture in Asia (CAA) held at Taiwan in 1999. CAA5-the 5th International Symposium on Cage Aquaculture in Asia is being organised by the Asian Fisheries Society in collaboration with the ICAR- Central Marine Fisheries Research Institute, Kochi, India and Asian Fisheries Society Indian branch, Mangalore, India at Kochi, India during November, 25-28, 2015. The CAA5 expected to provide an unique opportunity for fruitful interactions on the latest developments and future directions in research in cage aquaculture in the global level, especially in Asia-Pacific region.

CAA5 will focus on 5 major themes covering aspects from freshwater, brackishwater and marine cage farming. The major themes are:

- Production Systems
- Breeding and Seed production
- Nutrition and Feed
- Health and Environment management
- Economics, livelihood and policies

More than 200 delegates from around the globe are expected to participate in the symposium and deliberations. Eminent scientists will be invited to give keynote addresses and plenary lectures during the symposium.

Scientist and researchers are encouraged to submit their abstracts before the submission deadline date of 31 July, 2015. Topic of interest for submission includes, but is not limited to, the major themes of the symposium. Participants may kindly visit the symposium website www.caa5.net for registration, abstract submission, venue, accommodation and other relevant information.

11th Asian Fisheries and Aquaculture Forum

11th Asian Fisheries and Aquaculture Forum is scheduled for 3-7 August 2016 in Bangkok, Thailand and is being hosted by Asian Fisheries Society and Network of Aquaculture Centers in Asia-Pacific (NACA).

\$1M Sunhak Peace Prize names first two winners



Indian fisheries scientist, Dr. Modadugu V Gupta and the President of Pacific island nation Kiribati, President Anote Tong are the first winners of the \$1 million Sunhak Peace Prize announced on June 8, 2015 at the National Press Club in Washington D.C. Kiribati President Anote Tong and Indian researcher Modadugu Vijay Gupta were chosen from 182 candidates from 66 countries for the prize. Mr. Tong is fighting to manage the fate of his nation of 103,000 people who live on many islands in the South Pacific. Half of the citizens live on Tarawa Atoll, which has an average elevation of less than 7 feet above sea level and is being slowly lost to the sea. Mr. Gupta was honored for creating an aquaculture system tailored to poor, rural populations in Asia, Africa and the Pacific. His methods have allowed communities to feed themselves and empower women by teaching them how to raise and harvest the fish. The Sunhak Peace Prize is intended to recognize and empower innovations in human development, conflict resolution and ecological conservation, said organizers, who held a press conference to announce the inaugural winners. Each winner will receive \$500,000 at an Aug. 28 ceremony in Seoul, as well as an opportunity to describe their activities to an audience of 1,000 dignitaries from around the world.

UK trial shows fish oil could be grown in fields

Following the first successful field trial of plants genetically modified to produce health-promoting marine oils in their seeds, scientists of Rothamsted Research in Hertfordshire say that fish oil could be grown on land rather than under water. Published initial results from an outdoor trial of GM camelina, an oilseed crop, confirmed the positive findings of earlier glasshouse tests. The plants produced substantial amounts of omega-3 marine oils, beneficial components of the human diet available only from farmed or wild-caught fish.

Johnathan Napier, leader of the Rothamsted programme, said: "This is a globally significant proof of concept and a landmark moment in the effort to develop truly sustainable sources of feed for fish farms." The results appear in the journal Metabolic Engineering Communications.

The initial idea is not to sell the omega-3-rich camelina oil directly to human consumers. Rather, the camelina extract will be fed to salmon and other farmed fish instead of the fishmeal and fish oil they receive today.

"The world produces about a million tonnes a year of fish oil, and 80 per cent of that is used in aquaculture to feed back to other fish," Professor Napier said. "The omega-3 fish oil trait that we have developed is probably the most complex example of plant genetic engineering to be tested in the field," he added.

To get the metabolic process to work, the team had to insert no less than seven synthetic genes, based on DNA found in marine organisms, into camelina.

The omega-3 fish oil trait that we have developed is probably the most complex example of plant genetic engineering to be tested in the field. Camelina, also known as false flax, has been cultivated in Europe since the Bronze Age and is grown as an oilseed crop mainly in the US and Canada. Prof Napier calculates that a million hectares of GM camelina, producing 20 per cent omega-3 compounds in its seeds, could supply 75 per cent of the fish oil needed by aquaculture worldwide.

Global Fisheries Sustainability Fund

Marine Stewardship Council (MSC) has launched Global Fisheries Sustainability Fund for the support of critical fishery science research and projects. The fund is aimed at strengthening knowledge and capacity, to assist small scale and developing world fisheries in their journey to achieving MSC certification. The fund has an initial allocation of 400,000 pound sterling, split over two years. MSC is inviting applications from academic institutions, independent researchers, fisheries, governments and non-government organisations.

Development of new Technologies to limit environmental impact of aquaculture

Aqua-Spark, a global investment fund based in the Netherlands and focuses exclusively on aquaculture, recently made its first two investments, putting \$2m into a biotech company called Calysta, whose technology makes fish feed out of methane gas, and another \$2m into Chicoa Fish Farm, a tilapia-farming startup in Mozambique that intends to build up aquaculture in sub-Saharan Africa.

Aqua-Spark hopes to create an ecosystem of aquaculture firms that can work together as the industry grows. Calysta, a Silicon Valley startup, has developed a technology that uses a naturally occurring microbe to convert methane gas into a substitute for fishmeal. That could solve perhaps the biggest challenge for industrial aquaculture: its reliance on fishmeal and fish oil to feed the farmed fish, a practice that depletes the ocean of forage fish like menhaden and sardines.

Invention ready for licensing solves complications in dispensing fine particle fish food

NOAA Fisheries researchers have developed a fish feeder that allows fish farmers to automatically feed young fish on a recurrent basis while protecting the feed from oxidation and clumping. The patent-pending Microparticulate Feeder for Larval and Juvenile Fish was developed at NOAA's Northwest Fisheries Science Center in Seattle, Washington and is now available for licensing by a qualified U.S. company.

For details see: <http://www.nwfsc.noaa.gov/news/features/microparticulate/index.cfm>

New iBAP Program To Advance Responsible Aquaculture

The Global Aquaculture Alliance (GAA) is launching a program designed to help aquaculture farmers attain Best Aquaculture Practices (BAP) certification. The new program is called iBAP, with the "i" representing "improver." It incentivizes aquaculture facilities capable of attaining BAP certification to engage in a deadline-driven improver program, providing the assistance and encouragement necessary to apply for BAP certification.

Currently, about 5% of global aquaculture production is third-party certified, in terms of volume. GAA's mission is to feed the world through responsible aquaculture, and iBAP will create incentive for aquaculture producers to improve and ultimately achieve BAP certification. iBAP is to target farms predominantly but is open to other parts of the aquaculture supply chain, e.g. hatcheries. Facilities can apply directly or through organisations acting on their behalf, such as a processor or buyer.

Interactive map providing an overview of world fish production

GLOBEFISH has come up with an interactive map that provides an overview of world fish production. By clicking on the location of an individual country on the world map, one can see the fish production of that country. .

Visit: <http://www.globefish.org/total-fish-production-by-country-tonnes-2012.html>

Aquasense prepares for new, unique tilapia farm

A fish farmer in Panama is getting closer to opening an open-ocean tilapia farm, which could be the first of its kind. Aquasense Panama, an affiliate of U.S.-based Aquasense International, is doing site preparation in the Gulf of Panamá for its ocean farm site.

Aquasense signed a letter of intent with Gamma Seafood Corp. of Miami, Fla., USA back in March, with Gamma agreeing to market and distribute products of the new farm.

Raising tilapia in the open in salt water, Reilly said, will yield a better product. We have developed a non-traditional farming method for tilapia based on our preliminary research," he said. "That research showed that, when tilapia are reared in the full salinity of the open ocean and given nutritious food, the result is a much-improved fish product in terms of both taste and texture."

Source: <http://www.seafoodsource.com/news/aquaculture/28060-aquasense-prepares-for-new-unique-tilapia-farm>

Women farmers diversify through fish farming in Bolivia

The **Fish for Life project**, initiated by experts from Canada, Brazil and Bolivia, and carried out with families in Yapacani, Bolivia, has succeeded in expanding the farming families' diversity of food and farming options – previously based on single crop rice farming by successfully introducing women-led fish farming that is generating an additional US\$15,000 per year per family. Since 2008, before the project, fish consumption has increased from 3.8 kg per year per capita to 5.6 kg per year per capita. This is an area that traditionally eats little fish, despite good water resources and available local species of fish.

NEW PUBLICATIONS

Scaling up index insurance for smallholder farmers: Recent evidence and insights

Bad weather is a serious risk for low-income farmers, pastoralists, fisherfolk and others whose livelihoods depend on the natural resource base. The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is working with partners around the world to develop weather index-based insurance schemes that help secure farmers' livelihoods and give them the capacity to invest in climate-smart technologies, thereby helping to secure the world's food supply. In a new study, CCAFS examines insurance schemes that have reached large numbers of farmers, drawing forth lessons applicable to scaling up insurance in new contexts.

Full publication can be downloaded from: https://cgspace.cgiar.org/bitstream/handle/10568/53101/CCAFS_Report14.pdf

The role of women in the seafood industry

One in two seafood workers is a woman. This worldwide desktop study, the first of its kind, presents what is known, and what remains to be investigated in this crucial component of the seafood industry.

Women participate in all segments of the seafood industry, including fishing, farming, trading and selling, monitoring and administration. But the widespread lack of consideration for their role and work in the seafood industry is, in many respects, disadvantageous to them and ultimately bars them from participating fully and equitably in the industry. The primary aim of this report is to increase awareness of business leaders and policy makers, to expand their knowledge and sensitization about the value women bring to the seafood industry, and to encourage them to consider each time they develop a new project or a policy: "Have we not overlooked women?"

Copies of the full report in PDF format are being offered for free to Governments, IOs, Academies, and NGOs.

Please contact Globefish at globefish@fao.org

UPCOMING CONFERENCES

◆ International Conference on Aquaculture and Fisheries (Aquaculture 2015)

International Conference on Aquaculture and Fisheries (Aquaculture 2015) is scheduled for 20-22 July in Brisbane, Australia.

For details visit: www.aquaculture-fisheries.conferenceseries.com

◆ Aqua Nor 2015

Aqua Nor 2015 is scheduled for 18-21 August 2015 in Trondheim, Norway.

For details visit: www.nor-fishing.no/aqua-nor-2015-18-21-august/

◆ Vietfish

Vietfish is scheduled for 24-26 August 2015 in Ho Chi Minh City, Vietnam.

For details visit: www.en.vietfish.com.vn

◆ Aquaculture 2015

Aquaculture 2015 is scheduled for 23-26 August 2015 in Le Corum, Montpellier, France.

For details visit: www.aquaculture-conference.com

◆ China International Fisheries and Seafood Expo 2015

China International Fisheries and Seafood Expo 2015 is scheduled for 28-31 August 2015 in Guangzhou, Guangdong, China.

For details visit: www.chinafishex.com/index.asp

◆ 2nd International Conference on Aquaculture, Agro Business Industry and Agritourism 2015

The 2nd International Conference on Aquaculture, Agro Business Industry and Agritourism 2015 is scheduled for 4-5 September 2015 in Krabi, Thailand.

For details visit: <http://icaaa2014.weebly.com>

◆ World Seafood Congress 2015

World Seafood Congress 2015 is scheduled for 5-10 September 2015 in Grimsby, UK.

For details visit: www.wsc2015.com

◆ Seafood Expo Asia

The Seafood Expo Asia is scheduled for 8-10 September 2015 in Hongkong.

For details visit: www.seafood.expo.com/asia/

◆ **5th International Symposium on Stock Enhancement and Sea Ranching**

The 5th International Symposium on Stock Enhancement and Sea Ranching is scheduled for 11-14 October 2015 in Sydney, Australia.

For details visit: <http://www.searanching.org>

◆ **Aquaculture Europe 2015**

The Aquaculture Europe 2015 is scheduled for 20-23 October, 2015 in Rotterdam, the Netherlands.

◆ **GOAL 2015**

The GOAL 2015 is scheduled for 26-29 October 2015 in Vancouver, Canada

◆ **World Congress of aquaculture and Fisheries 2015 (WCAF 2015)**

The World Congress of aquaculture and Fisheries 2015 (WCAF 2015) is scheduled for 6-8 November 2015 in Qingdao, China.

For details please visit: www.bitcongress.com/wcaf2015/

AFS MEMBERSHIP RENEWAL NOTICE

Dear AFS Members:

Thank you all AFS Members for your ongoing commitment and support towards the Society!

The Secretariat has started to update the Members details in database.

Therefore, the Secretariat requests all AFS members to up-date their membership dues and contact information, to the Secretariat via email at info@asianfisheriessociety.org

Kindly renew your membership dues using online payment system at <http://www.asianfisheriessociety.org/join.php> or you may also request the membership form from Secretariat via info@asianfisheriessociety.org.

Membership is open for all!

**Please apply your membership at
<http://www.asianfisheriessociety.org/join.php>.**

If you have any question, kindly email us at info@asianfisheriessociety.org

SYNOPSIS OF PAPERS VOLUME 28 (ISSUE 1) :

ASIAN FISHERIES SCIENCE JOURNAL

Freshwater Fish Myeloid Differentiation Primary Response Protein MyD88: Characterisation and Homology Modelling by Using Computational Tools

TRAN NGOC TUAN and WANG WEI-MIN

The MyD88 proteins from fish species, including *Cyprinus carpio* Linnaeus 1758, *Carassius carassius* (Linnaeus 1758), *Oreochromis niloticus* (Linnaeus 1758), *Danio rerio* (Hamilton 1822), and *Ictalurus punctatus* (Rafinesque 1818) were used in this study. Physicochemical characterisations were performed by computing molecular weight, theoretical isoelectric point, amino acid composition, total number of positive and negative residues, extinction coefficient, instability index, aliphatic index, and grand average of hydropathicity. Three dimensional structures of proteins were analysed and validated by using PROCHECK's Ramachandran plot, ProQ and ProSA. The results indicated that all predicted models may be used as structures for investigated fish MyD88s.

Participatory Trial Using SMS to Share Shrimp Health Information Amongst Smallholder Shrimp Farmers in Sri Lanka

BURNS, THERESA, DEJAGER, TIMOTHY, SANDARUWAN, PRASANNA, DANIEL, SAM and STEPHEN, CRAIG

We hypothesised that short message service (SMS) might serve as a practical means of increasing shrimp-farmers' access to knowledge. We used a participatory approach to design a pilot study to use SMS messaging to mobilise knowledge about best management practices to prevent shrimp disease. We carried out an SMS trial with 60 farmers during one production cycle. At trial end, farmers reported that there was increased engagement in cooperative activity to reduce shrimp disease risks.

Profiles of Sex Steroids in Wild-caught Carp *Cyprinus carpio* Linnaeus 1758 During Ovulation Induction by Acute Versus Sustained Delivery Methods of Different GnRHa Analogues

ARYA VAZIRZADEH

The effects of acute versus sustained delivery methods of GnRHa on sex steroid profiles of wild-caught female carp *Cyprinus carpio* Linnaeus 1758 (Cyprinidae) were studied in fish receiving 20 $\mu\text{g}\cdot\text{kg}^{-1}$ mammalian or salmon GnRHa in acute (Linpe method) or sustained delivery methods, i.e., cholesterol pellets (Chol) and emulsion of GnRHa (GnRHa-FIA). Negative and positive control fish were injected by physiological saline (control) and 4 $\text{mg}\cdot\text{kg}^{-1}$ carp pituitary extract (CP), respectively. Plasma level of testosterone decreased after final injection in almost all treatment groups and gradually increased thereafter, and peaked at ovulation time. 17β -estradiol (E2) levels showed similar changes in almost all treatments with an increase at ovulation time and a decrease afterwards except for Chol groups in which the levels of E2 decreased at ovulation time. Plasma 17α , 20β -dihydroxy, 4-pregnane, 3-one (DHP) levels showed a surge at the ovulation time before a rapid decrease in all groups except for Chol groups in which the levels of DHP gradually increased during ovulation induction and remained high even after 48 h.

Morphometric and Meristic Divergence of Two Hybrid Catfish: Backcross (F1 hybrid female x *Pangasianodon gigas* Chevey 1931 male) and Reciprocal Backcross (*P. gigas*, female x F1 hybrid male)

KRIANGSAK MENGUMPHAN and PAIBOON PANASE

The parental F1 hybrids (*Pangasianodon gigas*, PG Chevey 1931, male x *Pangasianodon hypophthalmus*, PH (Sauvage 1878), female) were used as blood-stock. The two new catfish hybrids, backcross, BC {F1 hybrid, female x PG, male} and reciprocal backcross, RCBC {F1 hybrid (male) x PG (female)} were successfully produced. The aim of this study was to identify the characteristics of BC and RCBC types and to compare the results with two purebred catfish specimens (PG and PH) at a total length of 13-15 cm using 14 morphometric and 4 meristic measurements, respectively. The results indicated that the two catfish species and their hybrids were highly different from one another and all characteristics except the dorsal fin ray count could be utilized for the identification of the two pangasiid catfish species and the two hybrids at the fingerling stage.

SYNOPSIS OF PAPERS VOLUME 28 (ISSUE 2) :

ASIAN FISHERIES SCIENCE JOURNAL

Age and Growth of Black Sea Bream *Acanthopagrus schlegelii* (Bleeker 1854) in Tokyo Bay

HIROSHI YAMASHITA, SATOSHI KATAYAMA and TOMOYUKI KOMIYA

The age and growth of male and female black sea bream *Acanthopagrus schlegelii* (Bleeker 1854) was investigated in and around Tokyo Bay, Japan by means of otolith sectioning. The maximum ages of males and females were estimated at 20 and 28 years, respectively. The age-length relationships and parameters for the von Bertalanffy growth function were, $L_{\infty} = 407$ mm and 439 mm and $k = 0.510 \text{ yr}^{-1}$ and 0.346 yr^{-1} respectively. Sex ratio by age indicated that males were dominant among small/young fish while females were dominant among old/large fish. This suggested a protandrous life history style, which may be widespread in *Acanthopagrus* species.

Immunomodulatory and Growth Promoting Effects of Peptidoglycan Supplementation in Black Tiger Shrimp *Penaeus monodon* Fabricius 1798

MAILA V. PAN, REX FERDINAND M. TRAIFALGAR, AUGUSTO E. SERRANO, JR. and VALERIANO L. CORRE, JR.

A 30-day feeding trial was conducted to evaluate the influence of peptidoglycan supplementation on immune responses, growth, muscle fibre size and digestive protease activities of juvenile black tiger shrimp *Penaeus monodon* Fabricius 1798 (Penaeidae). Results indicate elevated immune responses including total haemocyte count, phenoloxidase and respiratory burst activities in peptidoglycan-fed shrimp compared to the control. Significant enhancement of growth in terms of weight gain, protein and lipid retentions was eminent in peptidoglycan-supplemented shrimps compared to the control group. The present findings suggest that peptidoglycan supplementation in *P. monodon* can boost immunological responses and improve growth performance through the promotion of muscle growth and enhancement of digestive protease activities

Efficiency of Monitor Roof in Maintaining the Thermal Conditions of Indoor Air and Water in a Medium Scale Enclosed Tropical Prawn Hatchery Building

MOHD SALLEH KAMARUDIN, AHMAD KAMIL KAMARUDIN, SABARINAH SH AHMAD and ELIAS SALLEH

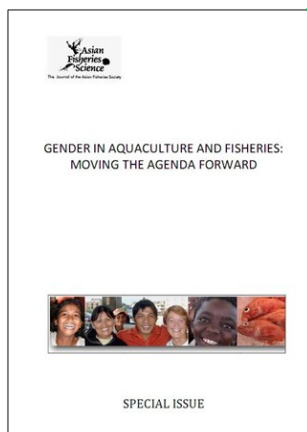
This paper investigated the effects of roof design on the thermal conditions of indoor air and larviculture tank water of a tropical freshwater prawn *Macrobrachium rosenbergii* (de Man 1879) hatchery building. The simulation study, using Integrated Environmental Solutions Virtual Environment, was based on an existing medium scale enclosed freshwater prawn hatchery. Monitor roof (vented ridge) was compared with the existing pitched roof design. The indoor air temperatures became totally acceptable for the occupants during daytime through the installation of reflective aluminium foil (RAF) to the monitor roof. Therefore, the combination of monitor roof and RAF was recommended to achieve acceptable indoor air thermal condition for occupants while successfully maintaining the water thermal requirement for optimal larval growth.

Nursery Culture of Oyster *Crassostrea belcheri* (G.B. Sowerby II 1871) Spat in Plastic Mesh Nets Suspended Horizontally and Vertically

S. TANYAROS, A. RUENGYING and W. TARANGKOON

A comparative study on the nursing of the tropical oyster spat *Crassostrea belcheri* (G.B. Sowerby II 1871) in plastic mesh nets suspended vertically and horizontally was conducted for 45 days. The results revealed no difference in absolute growth rate of shell width between both hanging methods. Spat suspended vertically showed higher absolute growth rate of shell length and instantaneous growth rate than those suspended horizontally. No significant difference was found between the mean survival rate of vertically ($78.8 \pm 3.4\%$) and horizontally suspended ($76.0 \pm 8.2\%$) spat. The vertically suspended net showed a higher fraction of spat larger than 1.22 cm than those in the horizontally suspended nets.

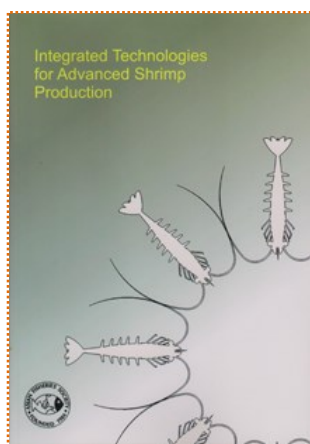
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Gender in Aquaculture and Fisheries: Moving the Agenda Forward **MERYL J WILLIAMS, MARILYN PORTER, POH SZE CHOO, KYOKO KUSAKABE, VEIKILA VUKI, NIKITA GOPAL AND MELBA BONDAD-REANTASO**

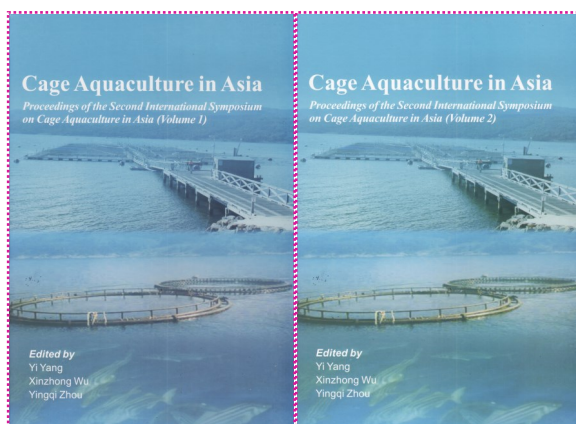
Gender in aquaculture and fisheries is still under-researched but interest is increasing. This volume shows progress in visualizing women's contribution to fisheries and aquaculture and also in structural analysis on value chains and institutions. Faced, however, with additional challenges such as climate change and economic integration, more nuanced analysis is now needed on ecological, economical, political and cultural systems. Factors such as class, age, ethnicity, race, caste, religion etc all come into play to define/condition gender relations.



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