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Biosecurity in Aquaculture: An Overview

Grasim Industries Launches AQUA ARMOR, a new approach to Bio-security in Aquaculture

33rd Edition

Aquaculture Expo 2019

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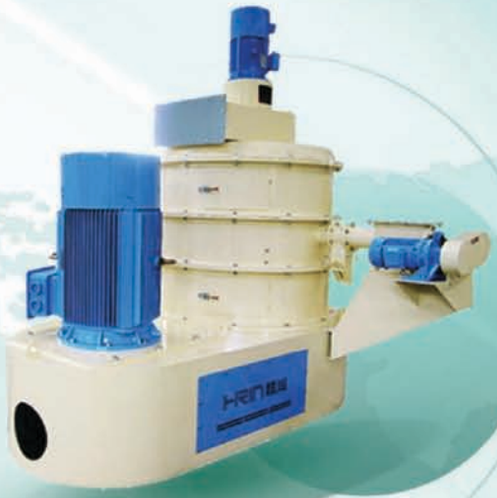

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Aqua International

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M. A. Nazeer

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Marine experts warn of fast warming of Indian Ocean

Dear Readers,

The December 2018 issue of *Aqua International* is in your hands.

In the News section, you may find news about – Marine experts have expressed their concern on fast warming of Indian Ocean thanks to global warming which, according to them, may pose a severe threat to species extinction. Speaking at the opening session of a Winter School on climate change in marine fisheries organised by the Central Marine Fisheries Research Institute (CMFRI), they said that climate change is affecting Indian fisheries through changes in stock productivity and its distribution.

The southern states decided to implement Kerala-inspired Suchitwa Sagaram (clean sea) project, which will see the ban of plastic waste dumping into the sea and procuring all forms of plastic materials in the sea or the ones that get entangled in the nets while fishing. Fisheries Minister J Mercykutty Amma told media persons that Kerala has already implemented the MLS for 58 fish species to ban juvenile fishing. She said "Now, other states have also come forward to implement the measure in their territorial waters to make the regulation more effective,"

The Indian fisheries and aquaculture is a vital sector of food production that provides nutritional security to the food basket and also contributes to the agricultural exports. They are not just a source of income but also help in maintaining cleanliness of the water bodies. In view of this, the Central Inland Fisheries Research Institute (CIFRI), Barrackpore had organized a river ranching cum fishermen awareness programme at Swarupganj Ghat, Nabadwip, Nadia, and West Bengal under the 'Namami Gange' programme.

CIFT has developed different models and capacities of solar dryers for hygienic drying of fish. CIFT-Hybrid model solar dryers are having LPG, biomass or electricity as alternate back up heating source for continuous hygienic drying of fish even under unfavourable weather conditions. The capacity of these hybrid solar dryers varies from 6 to 110 m2 of tray spreading area for drying of various quantities of fish varying from 10 kg to 500 kg. CIFT developed eco-friendly and energy efficient solar hybrid dryers are gaining momentum among fishermen community and dry fish business start-ups.

Farm shrimp production in India is set to fall 15% this fiscal year, farmers and traders said, citing the extensive damage caused by cyclonic storm Gaja that hit Tamil Nadu earlier this month. They said the storm hit the seafood industry at a time when it was recovering from the impact of a fall in global shrimp prices. India emerged the world's top supplier of shrimps in 2017-18 with an output of 6 lakh tonnes. Tamil Nadu is the largest producer of farmed shrimps in the country after Andhra Pradesh.

In the Article section, article titled **"Biosecurity in Aquaculture: An Overview"** by Kuntal Krishna Bera, Sutanu Karmakar, Prasanta Jana, Sambit Kisore Das, Soumyadip Purkait, Sandip Pal, Ramjanul Haque discussed about Suitable biosecurity measures can prevent emerging health issues and reduce impacts of disease and economic lossess in aqua farms. Hazard identification, risk assessment and risk management are the key steps for a standard biosecurity process. Proper quarantine of stocks, isolation of affected stocks, maintenance of personal hygiene, control of people, animal and vectors etc. are essential biosecurity measures.

Readers are invited to send their views and comments on the news Special feature and articles published in the magazine which would be published under "Readers Column". Time to time, we shall try to update you on various aspects of Aquaculture industry. Keep reading the magazine regularly and update yourself. Wish you all fruitful results in your efforts.

M.A.Nazeer
Editor & Publisher
Aqua International

NRS GROUP

Aqua International

Our Mission

Aqua International will strive to be the reliable source of information to aquaculture industry in India.

AI will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

AI will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

AI will recognize the efforts and contribution of individuals, institutions and organizations for the development of aquaculture industry in the country through annual Awards presentation.

AI will strive to maintain quality and standards at all times.

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Marine experts warn of fast warming of Indian Ocean

Kochi: Marine experts have expressed their concern on fast warming of Indian Ocean thanks to global warming which, according to them, may pose a severe threat to species extinction. Speaking at the opening session of a Winter School on climate change in marine fisheries being organised by the Central Marine Fisheries Research Institute (CMFRI), they said that climate change is affecting Indian fisheries through changes in stock productivity and its distribution.

Dr A Ramachandran, Vice Chancellor of Kerala University of Fisheries and Ocean Studies (KUFOS) speaking at the opening session of the winter school on climate change at CMFRI recently.

While inaugurating the 21-day winter school, which will provide a platform for an academic-oriented discussion on a wide array of topics on the effects of climate change in marine fisheries, Dr A Ramachandran, Vice Chancellor of Kerala University of Fisheries and Ocean Studies (KUFOS) said climate change is causing floods and drought across the globe. According to him, increased water temperature and higher carbon dioxide concentration make ocean more acidic. Dr Ramachandran warned that there would be a drop in productivity in future due to a gradual damage occurred to the ecosystem and biodiversity owing to climate change. He also said that strong commitments of the stakeholders and coordinated efforts arerequiredto stimulate growth of the country's blue economy in a more sustainable way.

Indian Ocean warming faster than Atlantic

Dr A Gopalakrishnan, Director of CMFRI said that Indian ocean is warming (0.11°C per decade) faster than the Atlantic (0.07°C per decade) and the Pacific (0.05°C per decade), and the sea surface temperature in Indian Ocean will increase by 0.600C by 2050.

"However, Indian marine fish harvesting is eco-friendlier compared to the global scenario. Our marine fisheries is emitting 17.5% less carbon footprints comparted to the global averages when it comes to fishing materials involved in fishery", he said.

"The CMFRI has catalogued resource-wise information and the institute is in the process of predicting fish biomass changes in our oceans in future. CMFRI has also prepared adaptation strategies to climate change with action plan. Research on estimating primary productivity of Indian exclusive economic zone (EEZ) for assessing the carrying capacity in Indian waters with respect to climate change is also underway", Dr Gopalakrishnan said.

Dr PU Zacharia, Course Director of the winter School and Head of the Demersal Fisheires division of CMFRI said the country experienced 24 extreme climatic events around the Indian coasts resulting in loss of life and property. "Estimates of climate change impacts are essential to devise climate change policies and suggest adaptation and mitigation measures", he added.

The Winter School is aimed at equipping scientists, researchers and other stakeholders with the tools and requisite knowledge to assess and adapt to the changes being occurred due to climatic variations. As many as 25 researchers and teachers are participating the in the programme.

Dr T V Sathianandan and P Kaladharan also spoke on the occasion.

South Indian fisheries ministers' meet to find ways for implementing uniform management measures

Kochi: Chief Minister Pinarayi Vijayan inaugurated the two-day south Indian fisheries ministers' conference at the Central Marine Fisheries Research Institute (CMFRI) at recently Saturday here. The conference was aimed at finding ways and means for the implementation of uniform management measures to optimally utilise marine resources. Fisheries ministers and senior officials from Andhra Pradesh, Goa, Karnataka, Tamil Nadu, Kerala, Puducherry, Maharashtra, Lakshadweep and Andaman and Nicoba attended the meet.

The conference was deliberate on reaching a consensus regarding the implementation of conservative programmes and other measures in the respective states for a sustainable growth of the fisheries sector. In addition, the resolutions taken at the meet will be brought into the attention of the Union Government, said Fisheries Department officials at a

press conference in Kochi.

The conference offerd a platform for serious discussions on a slew of areas such as national policy on marine fisheries (NPMF); ban on destructive fishing practices;regulation on fishing gear manufacture and restriction of mesh size (MLS); introduction of minimum legal size to curb juvenile fishing, regulation of fishing vessel construction; prevention of IUU fishing and illegal entry of fishing vessels into the territorial water of other countries; optimising fishing effort; aquarian reforms; a separate fisheries ministry at the Centre; ghost fishing and plastic pollution; climate change and ecoloabaelling and certification to boost exports.

The initiatives implemented by Kerala towards the conservation of marine resources was presented before the ministers from other states. The conference assumes significance in the wake of a strong demand to implement regulative measures such as MLS, which has been brought in force in Kerala, on a uniform scale in the entire south Indian states.

The two-day conference also hosted a special stakeholder meet in which representatives of fishermen and seafood exporters attended. Prof.K V Thomas MP, Hibi Eden MLA, S Sarma MLA, K J Maxi MLA, John Fernandez MLA and Mayor Soumini Jain also attended the conference.

The meet was jointly organised by the Fisheries Department, CMFRI, CIFT and KUFOS. CMFRI Director Dr A Gopalakrishnan, CIFT Director Dr C N Ravisankar, KUFOS Registrar Dr V M Victor George, fisheries department Additional Directors P Sahadevan, C R Sathiavathy, Deputy Director S Mahesh, CMFRI Principal Scientist Dr K Sunil Mohamed and Dr T V Sankar and others attended.

Other states to follow Kerala to end juvenile fishing via Minimum Legal Size

Fisheries Minister told that Kerala has already implemented the MLS for 58 fish species to ban juvenile fishing.

Kochi: The two-day conference of south Indian states' fisheries ministers, which concluded recently, decided to recommend a slew of proposals to the Centre including a hike in the budget for buying a trawler from Rs 80 lakh to Rs 1.5 crore, refund the road-tax collected from fishermen and bringing down the price of kerosene and the fuel for their boats.

The conference saw other southern states agreeing to implement the Kerala model in fisheries rules such as imposing Minimum Legal Size (MLS) measure to end juvenile fishing, banning the use of LED lights for coastal area fishing, and making use of square mesh trawl net mandatory for the trawling boats.

Fisheries Minister J Mercykutty Amma during the Southern Fisheries Ministers Conclave 2018 in Kochi

The southern states decided to implement Kerala-inspired Suchitwa Sagaram (clean sea) project, which will see the ban of plastic waste dumping into the sea and procuring all forms of plastic materials in the sea or the ones that get entangled in the nets while fishing.

Fisheries Minister Ms J Mercykutty Amma told media persons that Kerala has already implemented the MLS for 58 fish species to ban juvenile fishing. "Now, other states have also come forward to implement the measure in their territorial waters to make the regulation more effective," she said.

Urging the Centre to reduce the fuel price, the minister pointed out that there was no justification for charging `82 per litre for kerosene. "Earlier, there used to be a VAT of 40 per cent for kerosene. Now, VAT is abolished and there is GST of 18 per cent. But, instead of a fall in kerosene prices, now the fuel price has gone up under GST," she said. The conference asked the Centre to waive road tax for fuel for fishing, Mercykutty said the meet arrived at a consensus for demanding the Centre to permit the supremacy to the states to provide fishing rights beyond the territorial waters of 12 nautical miles. "The conference decided to seek the Centre's technical and financial support for equipping fishermen for deep sea fishing through cooperative societies. Other states decided to follow the Kerala model to implement participatory fisheries management councils and to use trawl nets with prescribed square mesh size recommended by CIFT," she said.

Other major decisions of the conference

According to Mercykutty Amma, the two-day conference of fisheries' ministers from south Indian states took following decisions

1. ***To urge Centre to introduce financial safety plans to compensate employment loss to the fishermen during the period of trawling ban.***
2. ***To follow CIFT recommendations for the fishing boat design and***
3. ***Horsepower of the engine.***

CIFRI organizes River ranching-cum-fishermen awareness Programme

The Indian fisheries and aquaculture is a vital sector of food production that provides nutritional security to the food basket and also contributes to the agricultural exports.

They are not just a source of income but also help in maintaining cleanliness of the water bodies. In view of this, the (CIFRI) Central Inland Fisheries Research Institute , Barrack pore had organized a river ranching cum fishermen awareness programme at Swarupganj Ghat, Nabadwip, Nadia, and West Bengal under the 'Namami Gange' programme.

The prime objectives of the NMCG sponsored project include an exploratory survey of the riverine fish

Diversity, stock assessment and enhancement of the popular food fishes like Rohu, Catla, Mriqal, Calbasu and Mahaseer by ranching in the depleted stretches of river Ganga.

Released fishes like Calbasu, Mrigal and Rohu will not only provide increased fish catch and improved livelihood but also help in maintaining the cleanliness of the river as they feed on organic remnants.

Dr B K Das, Director, CIFRI, urged the fishermen community to adopt suitable management strategy like allowing the released fishes to grow and proliferate for restoration of the fish stock. He also mentioned about all the activities of the ongoing NMCG project like restoration of Hilsa at upstream of Farkka barrage, continuous river ranching efforts during past two years in entire stretch of river Ganga, etc. He also highlighted about different sources of pollution of the river. Dr. Das requested the fishermen to actively take part in maintaining nirmal dhara of Ganga by preventing plastic and other pollution practices in river.

Shri Haridas Debnath, Sabhapati Panchayet Samiti (Nabadwip) said the ill effects of sugar mill effluents coming from neighbouring districts of Bangladesh through adjacent river Jalangi (a tributary of river Ganga) causing large scale fish mortality. Mr Pundarikakshya Saha, MLA (Nabadwip) also graced the occasion.

Mr Sirajul Seikh, Pradhan, Swarupganj Gram Panchayet, highlighted the need of improved coordination between central, state and local administration for better management of the river. He also urged the fishers not to use zero mesh seine net (locally known as ber jaal) which is highly detrimental to the fish diversity of the river.

As a part of the programme, 3 lakhs seed of fishes like Calbasu, Mrigal and Rohu were released in the river Bhagirathi (Ganga) in front of the holy ISKCON temple, Mayapur. The programme was attended by more than 150 local active fishermen and their family members.

Indian Army sponsored training programme for tribal youths of Assam inaugurated at ICAR-CIFA

Bhubaneswar: A training programme on "Freshwater aquaculture as livelihood option for tribal youths" has been started at Central Institute of Freshwater Aquaculture, Bhubaneswar, Odisha from 14 to 17 November 2018. The programme was sponsored by 5/5 Gorkha Rifles (Frontier Force), Indian Army, Assam. 22 persons are participating in the programme.

The inaugural function was held on November 14 in CIFA. Col. D.D. Swain, Commanding Officer, Bihar Regiment, 120 Battalion, Indian Army, and Bhubaneswar was the Chief Guest. He appreciated the role of Indian Army in exposing the unemployed tribal youths to scientific aquaculture practices at a famous institute like CIFA. He urged to have the linkage among the Indian Army, trained farming community and CIFA for information sharing in freshwater aquaculture and more collaboration in future.

Dr Bindu R. Pillai, Director, CIFA, Kausalyaganga was the president of the function. She highlighted the role of CIFA for dissemination of freshwater aquaculture technologies to the tribal areas of the country including NEH States. She encouraged the participants to get as much knowledge about fish culture from CIFA and to use it for their livelihood

development.

Dr. B.C. Mohapatra, Principal Scientist and Chairman, Tribal Sub Plan Programme of CIFA welcomed the participants and guests to the programme, and informed the gathering regarding the role of the institute for dissemination of aquaculture technologies to the tribal communities of India through TSP and NEH Schemes. He informed that previously the institute had conducted three such training programmes for tribal youths of Assam sponsored by the Mahar Regiment of Indian Army. Capt. Shivansh Tripathi, Captain, 5/5 Gorkha Rifles (Frontier Force), Indian Army, Assam thanked ICAR-CIFA for conducting this programme for tribal youths of Assam.

Dr (Mrs) Pravati K. Sahoo, Principal Scientist & Course Director, CIFA proposed the vote of thanks. The programme ended with National Anthem. Dr I. Shiva Raman and Mr. Nitish Kumar Chandan, Scientists acted as Course Coordinators.

Manipur has potential in Ornamental aquaculture: Scientists

For the first time in Manipur, fish experts from Indian Council of Agricultural Research - Central Institute of Freshwater Aquaculture

For the first time in Manipur, fish experts from Indian Council of Agricultural Research-Central Institute of Freshwater Aquaculture CIFA Bhubaneswar visited the state and conducted a three-day training programme on ornamental fish farming at ICAR Manipur centre premises in Imphal.

The training programme which will continue till November 16 was formally inaugurated at the hall of ICAR Manipur centre at Lamphelpat near Imphal on Wednesday.

In her key note address, Senior Scientist Dr Ch Basuda said the aquaculture and potentials of ornamental fishes in the region would be an area of interest as very less people explore this sector in Manipur.

"I hope such training programmes will help our educated farmers in learning more on ornamental fish world and its trade prospects," she said.

Principal Scientist Dr Saroj Kumar Swain speaking to Northeast Now on the sideline of the training programme which was attended by around 30 farmers coming from various parts of the state, said they are targeting the unemployed youths of Manipur to take up ornamental aquaculture as a potential entrepreneurial avenue.

"If we could accommodate only 1-2% of the educated unemployed youths of the state in this new avenue, we would be able to address some of the livelihood issues of the state," he said.

"So apart from giving training to the educated youths, we may also take up necessary follow up programmes of the trainings in the coming days," he added.

Principal Scientist Dr Saroj Kumar Swain of ICAR-CIFA Bhubaneswar speaking at the training programme in Imphal

Sharing the success of the ornamental fish village in Odisha and West Bengal, the visiting fish scientists also expressed the possibility of developing ornamental fish village in the region considering its existing potentials.

According to CIFA scientist, around 17 fish species including some indigenous fish varieties from north eastern states have been practically cultured at their institution and started to transfer the technology as well as the said fish species having ornamental values to the farmers for commercial breeding.

Grasim Industries Launches AQUA ARMOR a new approach to Bio-security in Aquaculture

With the event aptly titled "TRANSFORM – Biosecurity in Aquaculture", Grasim Industries limited - Chemical Division organized the launch of its new products and services for the Aquaculture community at Fortune Murali Park, Vijayawada on 16 November 2018. More than 150 participants including shrimp farmers, consultants and trade partners attended the event.

During the Inaugural session, Mr Shailendra Deshpande – CMO, Specialty Chemicals at Grasim welcomed the guests and briefed them about the future outlook of the company. He emphasized about the need for transformation in the field of Bio-security. He also highlighted the efforts taken by the company to bring a new approach in water treatment for Aquaculture, before setting the tone for the launch of AQUA ARMORTM.

The entire team of Grasim comprising of R & D, Technical Services, Sales, Marketing, Production and Supply Chain and Logistics were present at the event. It was a proud moment for Mr Sanjeev Goel, National Head – Marketing to unveil the products AQUA ARMOR D, AQUA ARMOR D+, AQUA ARMOR C and AQUA ARMOR CAL+ for the participants. The launch was well accepted by the guests with a thunderous applause.As explained by Mr Sanjeev Goel, AQUA ARMORTM is positioned as a one-stop solution for the water treatment needs of Aquaculture farmers. The product offerings have high global quality standards and will be supplimented by dedicated technical services by team of experts in Water Quality Management. AQUA ARMORTM is the answer to water Disinfection, Clarification and Mineral supplement needs of the farmer. They are aiming at improving the Bio-security of shrimp harvest, thereby ensuring that the shrimps are healthy and export-worthy!

Shailendra Deshpande - CMO - Specialty Chemicals at Grasim addressing the gathering at the launch event of AQUA ARMOR

Mr Mahesh Naykude , Marketing Manager – Aqua Armor and Mr Satish Kumar, Aquaculture Consultant, presented the usage and benefits of the complete product range.

Product Brief :

Aqua Armor D & D+ are Disinfection agents available in the form of free flowing powder, with pack size of 25 kgs. They destroy the bacteria, viruses and fungi in contaminated water, thereby improving survival and growth of Aquaculture species. Aqua Armor D+ is a specially formulated superfine grade, which leaves less sludge residue and has better solubility for faster and lasting disinfection.

Aqua Armor C is the first of its kind in the industry, and is available in the form of liquid in 30 kg drums. It helps in faster removal of suspended solids and turbidity, thus improving the water quality by significant reduction in toxicity.

Aqua Armor Cal+ is a Premium Calcium mineral supplement. It aids in maintaining salinity and mineral balance and

Inauguration of AQUA ARMOR by Grasim team Pradeep Agarwal - Production Head, Ashish Chakravarty - Production Incharge, Sanjeev Goel - National Head Marketing, Alok Singh - National Head Marketing, Dr Sanjeev Gupta - Head R&D, Rakesh Baghel - Technical Head and Ameya Kamerkar - Head CSO.

Mahesh Naykude (Marketing Manager - Aqua Armor) and Satish Kumar (Aquaculture Consultant) on stage introducing the AQUA ARMOR product range to the audience

prevents white muscle problem in Shrimp. It is available as a free flowing powder in 25 kg packing.

Mr Satish Kumar interacted with the audience in local language and addressed all their doubts and queries.

Mr Rakesh Baghel – Technical Head and Mr Dainik Khant – Technical Manager at Grasim further elaborated on the technical superiority of the products with the help of case studies conducted at model sites in various parts of India. They stressed on the importance of total water quality management and how the Aqua Armor range supports this new system. The key takeaways from their presentation was that water quality management is essential to reduce toxicity, unwanted organic matter and microbial mass of incoming raw water, thus reducing the mortality rate of shrimps&water born diseases.

Clear water provides good plankton bloom and helps in better penetration of light which improves the photosynthesis and thus the DO level. AQUA ARMOR C due to its better performance, significantly reduces the sludge build up in the pond which restricts anaerobic condition and gas generation. This has a direct positive effect on the health and environment of the pond, which translates into improved shrimp growth.

The Aqua Armor technical support team will personally visit the sites and conduct water analysis to recommend the ideal dosage rate. They will also be working along with the farmers in maintaining the data records and analyzing the critical parameters which determine the water quality. The company has also developed a Testing kit for the farmers, to keep a quick check on the important parameters.

AQUA ARMOR D & D+ offer high degree of Biosecurity by killing pathogen and virus in water. They are strong purifying agents that help in reducing suspended and organic matters, thereby inducing good growth of phytoplankton. The technical support team will be advising on the amount of disinfecting agent requiredbased on incoming water analysis.Moreover, the technical support will also be helping in resolving the on-ground difficulties faced by the farmers and suggesting system improvements. They will be focusing on educating the farmersand keeping them updated with the latest technology.

AQUA ARMOR CAL+improves and maintains the calcium balance which is essential in the biological processes of fish bone and scale formation, blood clotting and other metabolic reactions. It helps in maintaining the minerals ratio, enhance moulting and prevent the white muscle problem in shrimp.

Dr Sanjeev Gupta – Head R&D at Grasim explained how the company drives its Research and Development initiatives from Bharuch, Gujarat where they have developed DSIR recognized Water application center with state-of-the-art facilities.

M.A. Nazeer – Editor, Aqua International addressed the gathering on latest trends and future outlook on Bio-security

Mr M.A. Nazeer – Editor, Aqua International addressed the gathering in local language and gave the audience a glimpse of the latest trendsand future outlook on Bio-security. He also appreciated the efforts taken by Grasim to understand the needs of the farmer community and come up with a complete product range along with technical support.

The event was concluded with Vote of thanks by Mr Rajendra Parab (Marketing Manager).

Tamilmani S, Technical In charge – South, getting his picture clicked alongside the AQUA ARMORTMproduct range

Brief highlight about the company: Grasim Industries Limited - Chemical Division is part of the Aditya Birla Group, which is a US $44.3 billion corporation. They are among the largest producer of Chlor-Alkali products globally, catering to vast array of applications with their premium range of Specialty chemicals.They offer products &technical services for superior performance in Water treatment applications like Municipal Drinking Water, Sewage wastewater, ETP, Sludge-free Clarification of Pools and Pre-treatment / Process Treatment for various Industries.

A view of Aquaculture farmers and other stakeholders in the AQUA ARMOR Launch event held in Vijayawada.

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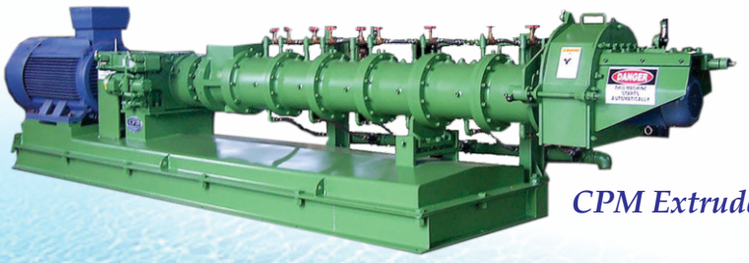
3. Complete Plant Automation Solution, on **GATE In to GATE Out concept.**
4. In-house design and manufacturing of Pre Fabricated steel structures for Plants, Warehouses etc.

CPM Dryer

CPM Pellet Mill



CPM Extruder

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Sheng Long launches its Shrimp feed production in India

Royal Dragon, Lion Feed are their 2 famous Aquatic feed brands; Haid Group's Global annual feed sale turnover Rs 41,000 crores

Chennai: Sheng Long Bio-tech, specializing in aquatic feeds, having its regional head quarter in Vietnam and strong marketing shares in Vietnam, Malaysia, Indonesia, India, Taiwan, Bangladesh, Ecuador and Iran has launched shrimp feed production in its Indian feed plant constructed near Chennai. The feed sales of Sheng Long Bio-tech Business Unit is more than 300,000 MT this year, generating an annual revenue of Rs 1,875 crores and Its parent company Haid Group's yearly feed sales exceed one crore MT with the turnover of over INR 41,000 crore in 2018 globally.

Sheng Long Bio-tech India Pvt Ltd was incorporated in 2014. In 2016, in order to cater to the needs of Indian farmers by providing best quality shrimp feed, L.vannamei post larvae, Aquatic healthcare products, best service and all-round customer satisfaction, the company decided to invest on the Feed mill and Hatchery in Tamil Nadu, India. The state-of-the-art feed mill spans across an area of 5.57 hectares located in SIPCOT Industrial Area, Thervoykandigai, Thiruvallur District ,TN . This feed mill is equipped with 3 latest feed production lines having the capacity to produce 50,000 MT per year L.Vannamei feed with a space for expansion of another 50,000 MT /year. The facility includes an Aqua Health Product manufacturing unit to supply quality products to our customers, said a note from the company.

The feed mill took 2 years to construct and have encountered various hurdles and obstacles during the construction, but with the strong determination of Sheng Long Team, the company was able to overcome these barriers.

The production date was scheduled to start right after the Festival of Light - Diwali, where Indians look forward to go back home for reunion and get together. However, the Indian team voluntarily sacrificed their festivities mood to ensure that the production goes as per schedule. On the other hand, Sheng Long Vietnam send its best production team and equipment supplier send their team too, to train and assist the Indian Team successfully.

On November 9, 2018, two days after the Diwali festival, the first India feed mill went into trial and mass production successfully. Within 2 weeks, the first batch of Sheng Long famous aquatic feed brand – "Royal Dragon" and "Lion Feed" , "Made in India", feed were tested locally and received excellent feedback from the Pan India customers. Now, Sheng Long is able to satisfy the Customers' requirement of fresh and Quality feed in hours from the Chennai new feed plant.

Sheng Long India will start its next feed mill construction in 2019, to meet 1 lakh MT of aquatic feed target in the next few years and 2 crore MT for the entire Haid Group before year 2022. This not only shows the determination of Sheng Long, but also proves that Sheng Long will go miles to be an aquaculture total solutions service provider for India customers, which includes the mass production of 1000 Million vannamei post-larvae from Hatchery as well as aquatic healthcare products made in India.

Sheng Long India Team

- **Head of the Feed Mill Operations: *Shi Ji yang*** (Genl Mgr)
- **Marketing Head: *A. Kumaresan*** (Sr Dy General Manager)
- **Production Head: *Jiang Wen***
- ***Technical Manager: Chiu Chun Ting***
- **Marketing Coordinator: *Mrs Nasreen Shabbeer*** (Assistant Manager)
- **Technical Services Center Manager: *Iyappan***

Sheng Long India team in a jubilant mood with the launch of its feed plant near Chennai.

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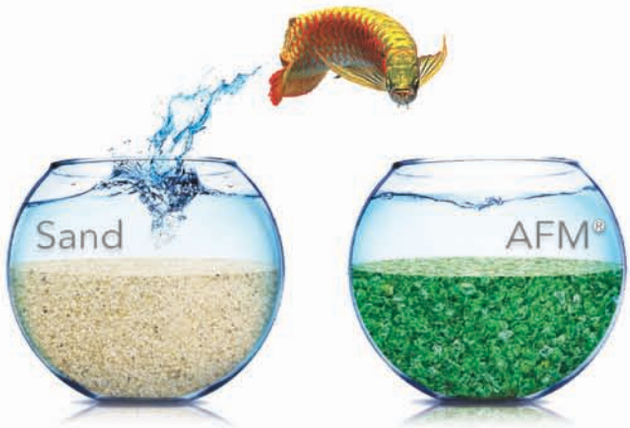

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Successful Commissioning of Solar Hybrid Dryer by an Entrepreneur

CIFT Solar dryer commissioned at Kumbalanghi, Ernakulam

ICAR-CIFT has developed different models and capacities of solar dryers for hygienic drying of fish. CIFT-Hybrid model Solar dryers are having LPG, biomass or electricity as alternate back up heating source for continuous hygienic drying of fish even under unfavourable weather conditions. The capacity of these hybrid solar dryers

varies from 6 to 110 m2 of tray spreading area for drying of various quantities of fish varying from 10 kg to 500 kg. CIFT developed eco-friendly and energy efficient solar hybrid dryers are gaining momentum among fishermen community and dry fish business start-ups.

Mr Martin of Kumbalangi (Ernakulam district) was one of the trainee who attended the two-day training program on pre-processing and drying of fish conducted during 24 - 25 October, 2017 at the Engineering Division of. In light of the knowledge about the energy and cost efficient solar drying technology CIFT perceived during the training period, he approached the Institute with a determined plan to start a venture in hygienic dry fish business. Initially, he registered as an incubatee of Agri-business incubation unit of the Institute and started drying fish in CIFT solar dryers, for which an operating cost was incurred from him.

Shrimp, mackerel, lizard fish, silver croaker, sole fish, glassy perchlet, anchovy etc. were commonly dried. He did test marketing of the solar dried fish with CIFT logo under the brand name "EMMA Dry Fish Products" in the local markets and nearby super markets.

The demands for the hygienic and solar dried fish products made him realize the potential of dry fish business. Since, CIFT has around 10-15 incubatees who adopted the solar drying technology, the availability of each incubatee to use the dryer was less. Hence, Mr Martin approached CIFT with an intention to purchase one unit of solar-electrical dryer of 20 kg capacity under the technical support of CIFT. The request was accepted and fabrication of the dryer was executed through CIFT empanelled agency. On 13 November 2017, the dryer was commissioned at the residence of Mr Martin at Kumbalanghi. CIFT officials visited the site and evaluated the performance of the dryer. Currently Mr Martin is supplying hygienic solar dried fish products under the brand name of "EMMA Solar Dried Fish Food-Premium Quality" in 31 supermarkets of Ernakulam district.

Gaja cyclone to hit farm shrimp production in India

Farm shrimp production in India is set to fall 15 % this fiscal year, farmers and traders said, citing the extensive damage caused by cyclonic storm Gaja that hit Tamil Nadu earlier this month. They said, the storm hit the seafood industry at a time when it was recovering from the impact of a fall in global shrimp prices. India emerged the world's top supplier of shrimps in 2017-18 with an output of 6 lakh tonnes. Tamil Nadu is the largest producer of farmed shrimps in the country after Andhra Pradesh.

"Infrastructure like roads and buildings have suffered heavy damage, cutting off access to these places," said Mr S Muthukaruppan, past president of Society of Aquaculture Professionals.

He said stocking and harvest of shrimps will be delayed in Tamil Nadu towns of Nagapattinam, Vedaranyam and Muthupet, which are known for their shrimp production.

"Already the first two harvests this year have not been that good due to rains and diseases," said Mr V Balasubramaniam, general Secretary of Prawn Farmers Federation of India. "Though big farms in Tamil Nadu have started stocking young shrimps for harvest a few months later, it will take more time for the small farms to get ready."

Farms in Andhra Pradesh, the largest producer, start stocking activity by January-February. Frozen shrimps account for 70 % of the value of the seafood export from the country that touched a record Rs 45,000 crore last year. The first quarter of the current fiscal saw a 7 % rise in volumes and over 8 % rise in value year-on-year at 299,354 tonnes valued at Rs 10,888 crore.

At present, demand from the US, the largest buyer, is driving the Indian seafood exports. According to a report by trade finance company Drip Capital, there are mixed signals for the shrimp exports in the seasons ahead. While increased competition and decreased demand from Europe seem to be depressing sales, analysts expect Indian shrimp exports to the US will continue to grow by 15 - 20% this year.

The share of Europe in Indian seafood exports has fallen by about 20 % in the last 10 years to 16 %. The share of the US currently stands at 33 %.

Exporters are meeting farmers in coastal states to make them aware about antibiotics and diseases before implementation of seafood import monitoring programmes (SIMP) begins in the US on January 1.

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Biosecurity in Aquaculture: An Overview

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Introduction

Spreading of aquatic animal disease is turning into a serious concern to the world aquaculture industry and profitability. New diseasesareemerging due to growing aquaculture production, production in new locations, new candidate species and new culture methods. Diseasesspread with a higher magnitude is a consequence of increasing international seafood trade volumes, m+ovement of live aquatic animals (for human consumption or aquaculture), trade of aquaculture equipment, shipping and climate change. Some pathogens are frequently encountered in farmed stock and only cause disease when favorable conditions arise, such as when animals are stressed or when environmental conditions are suitable. Other pathogens can be highly detrimental even under ideal husbandry conditions. The impact of these pathogens can be managed with good hygiene and husbandry practices. So, Health maintenance in aquaculture is now considered to be one of the most important aspects of aquaculture development and management. Biosecurity is the key to reduce the risk of diseases entering in a farm. Suitable biosecurity measures can prevent emerging health issues and reduce impacts of disease with the principle of preventing diseases rether than curative response.

What is biosecurity?

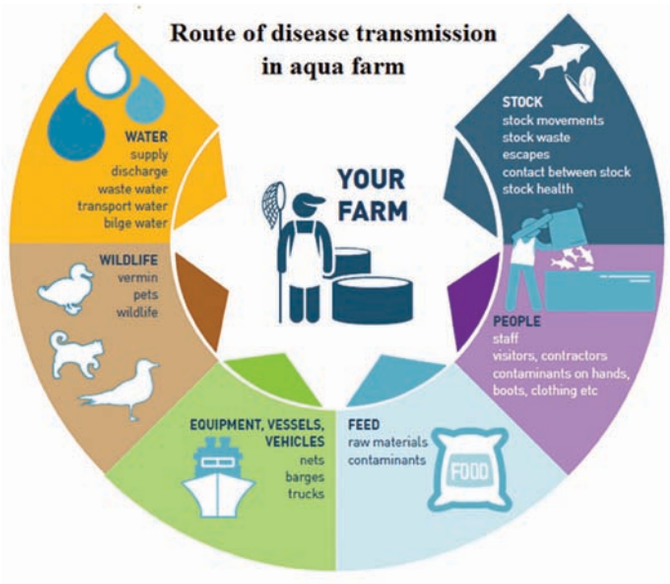
"Biosecurity includes a set of standard scientific measures, adopted to exclude pathogens from culture environments and hosts and, more broadly, limit the establishment and spread of pathogens" (Mohan *et al*., 2003; Moss *et al*., 2012).

Reliable sources of stocks, adequate detection and diagnostic tools for excludable diseases, disinfection and pathogen-eradication, and practical accepted legislation are the key elements of biosecurity. Such measures protect seed from transmissible infectious agents and reduce the consequences of infection (Toma et al., 1999). Screening of pathogens is crucial to block entry routes (Hewitt and Campbell, 2007).

Major routes for transmission of pest and pathogens

A. Transmission routes onto the farm

There are several sources of disease entrances onto the farm



Source: MPI, 2016

Animals

Animals entering the farm pose a significant risk of disease spread particularly when they are of unknown health status. The aquatic animals act as vectors of the diseases which include brood stock, seed stock, eggs and animal products. Other animals like wildlife, birds, pests, and scavenger etc. can also act as important source of diseases.

People

People including workers, staffs from other farm, visitor, contractors and other members can presents a significant risk of disease transmission onto the farm.

Vehicles, vessels and other equipment

Vehicles which have been used for transportation of animals previously can bring pathogen on to the farm. Vessels can act as a likely source for pathogen introduction when they have been used at other farms or have been in close contact with animals. Equipment which has been previously used in other

Highlight Points

- **Suitable biosecurity measures can prevent emerging health issues and reduce impacts of disease and economic lossess in aqua farms.**
- **Hazard identification, risk assessment and risk management are the key steps for a standard biosecurity process.**
- **Proper quarantine of stocks, isolation of affected stocks, maintenance of personal hygiene, control of people, animal and vectors etc. are essential biosecurity measures.**

farms or in contact with animals can also pose a significant disease risk and can transmitte disease onto the farm.

Water

Water supply of a farm has a major influence on health of animal. In semi-opensystem like cage culture in sea or lakes, water supply can be little controlled. In land-based culture nature of water supply, presence of contaminants considerably affects the risk of disease transmission onto the farm.

Feed

Manufactured feed or raw materials can act as source of pathogen of serious concern when they are not handledor stored properly.

Waste

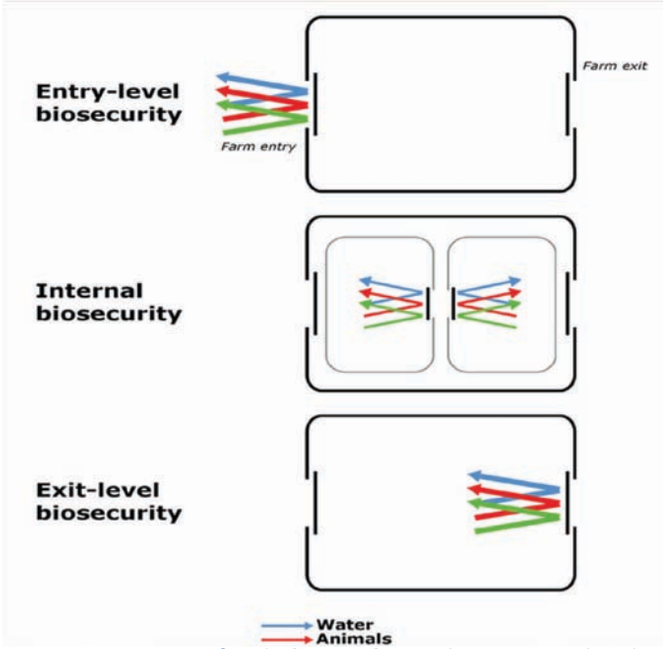
Farm waste materials such as dead animal, sewage water, processing wastes, cleaning effluents can act as vector of pest and pathogens. Appropriate infrastructure and waste treatment standard should be followed to maintain proper biosecurity in farm.

B. Transmission routes within the farm

Different production and processing units of the farm possess different health status. So, there is a significant risk of disease transmission between these units of the farm. To mitigate the impact of disease transmission within a farm should be managed by internal biosecurity measures. For example different areas of the farm can be managed separately by following proper biosecurity standards.

C. Transmission routes from the farm

The disease transmission from the farm is similar to the paths of transmission on to the farm. The transmission routes from farm can severely affect other farms, water sources and wildlife population of the area. For avoiding the risk of disease transmission, the routes from the farm should be managed appropriately with exit-level biosecurity standards.



Source: Department of Agriculture, Subcommittee on Aquatic Animal Health (SCAAH), Canberra, 2016

Key measures to be taken prior to implement of farm biosecurity measures

Hazard identification	Risk assesment	Risk management
• Identify the hazard	• Determine the level of risk due to hazard and its probable consequences	• Identify and select suitable measures to mitigate the hazard below threshold level.

Farm biosecurity procedure

1. *Stock health management:* Stock health should be maintained by keeping stock stress to minimum level and maintaining optimum water quality.
2. *Maintaining health during stock movement and transport:* Minimize the pest and disease risk associated with stock movements onto, within and off your farm by maintaining appropriate quarantine procedure during stock movement.
3. *Water treatment:* Minimize the risks of pests and disease entry associated with incoming water should be minimized through maintaining proper treatment.
4. *Equipment, vehicleand vessel:* Preventing the entry and spread of pest and disease by assessing all equipments, vessels and vehicles entering the farm through proper biosecurity procedure like disinfection of equipments, controlled use etc.
5. *People management:* Record should be kept of the workers and visitors and all the workers should be trained with biosecurity standards.Use of foot dips and controlling the movement and access of people in the farm are crucial.
6. *Feed and feeding:* Food-borne disease organisms can be minimized by proper handling and storage.
7. *Preventing scavengers and predators:* Control or eradicate predators, wildlife, scavengers and other organisms from farm area.
8. *Waste management:* wastewater and solid waste should be treated appropriately before disposal.
9. *Record keeping:* Maintain record for all aspect of biosecurity plan(staff training, workers and visitor's log, inspection and maintenance of farm infrastructure).
10. *Monitoring and surveillance:* Regular monitoring and surveillance practice should implemented throughout the farm.
11. *Auditing:* Audit should be conducted of on farm biosecurity plans and their implementation on regular intervals.

An appropriate biosecurity management plan will help to access and prioretise all the risk and hazard relevent to farm. Implementation and maintenance of good biosecurity practice will lead to prevention and reduce of asscociated risks. A good biosecurity practice includes proper quarentine method for disease prevention, isolation of affected stocks, maintaining proper hygine of personnels through use of foot-dips, vehicle-dips, hand gloves etc. and proper infrastucture

for water and waste water treatment plan. Fencing for prevention of birds, barrier between adjacent ponds and farms and proper documentation and monetoring of biosecurity is crucial for a standard biosecurity practice.

Biosecurity in shrimp farm

Global production of shrimp is falling down, due to potential economic losses from disease outbreaks and is going to affect the survival of the industry.To mitigate crop loss from disease and cost-effectiveness, on-farm biosecurity protocols may be more practical and less expensive than selective breeding programs designed to enhance disease resistance. The use of SPF shrimp is an important component of any biosecurity plan and the stocking of SPF post-larvae can prevent the introduction of specifically listed pathogens from infected seed(Mosset al., 2012).

In adition to shrimp seed, influent water represents one of the most significant ways pathogens can enter a shrimp farm. Traditionally, shrimp have been cultured in coastal, earthen ponds where flow-through water exchange is used to maintain acceptable water quality (Hopkins et al., 1993). However, this practice resulted in the introduction and spread of virulent pathogens from pond-to-pond and farm-to-farm (Lotz, 1997). In an effort to mitigate this problem zero water exchange system evolved.

Specific pathogen free

Over the past decade, there has been an increasing trend among shrimp farmers to stock their ponds with postlarvae produced from healthy, domesticated broodstock in an effort to mitigate crop loss from disease (Crocos and Moss, 2006; Lightner *et al*., 2009). The disease status of captive broodstock can be controlled, to a significant extent, using Specific Pathogen Free (SPF) shrimp (Lotz, 1997; Lightner *et al.*, 2009).

SPF stocks relate only to stocks retained in the breeding center that have already undergone rigorous quarantine and screening efforts. Once stocks leave the breeding center, they are considered high-health, which means they are free of certain pathogens.(Pruder, 2004) SPF shrimp are free of one or more specific pathogens which meet the following criteria: (1) the pathogen can be reliably diagnosed, (2) the pathogen can be physically excluded from a facility, and (3) the pathogen poses a significant threat to the industry (Lightner et al., 2009).

Water exchange

The second most likely source of pest or disease-causing organism is exchanged water. The using of raw or untreated water is responsible for the introduction of disease when ponds are stocked with high-health shrimp seed. Fill and exchange water needs to be treated and disinfected appropriately. The expenditure in water disinfection process quickly shifted production system research under the zero-water exchange banner. Biosecure shrimp production systems stocked with high-health seed represent an emerging technology. Zero water exchange system provides environmentally sustainable and economically viable alternative to conventional shrimp culture(Pruder, 2004).

Status of biosecurity implementation in shrimp hatcheries of India

With annual production of 140666tons India is one of the largest shrimp-farming countries in Asia (MPEDA, 2016). Many shrimp hatcheries of India and other Asian countries are actively involved in meeting the regional shrimp seed demand. However, there is no consistency in implementation of standard operating procedures or biosecurity measures.

Raja *et al*. showed that in Indiahighest biosecurity implementation rate of personnel procedures was 40% in large hatcheries and 50% in small and medium hatcheries. The operational measures were implemented at a rate of47% in large, 84% in medium and 63% in small hatcheries. The highest rates for screening of pathogens were 50% in small and large hatcheries and 25% in medium. The only measures implemented in all hatcheries were use of foot deeps, disinfection of hands after handling live feed/brooders/larvae, and virus screening ofbrood fish, indicating regular practice in all hatcheries and the implementation gap is of 0%. The need for large financial support, lack of understanding, lack of enthusiasm to implementare the major factors for the poor implementation of biosecurity measures.

Conclusion

Sometimes farmers consider the biosecurity measures as unnecessary financial burden without realizing its potential positive impacts. Mostly small and marginal farmers in the developing countries do not follow any biosecurity measures in their farm. Lack of scientific knowledge and support is the major constrain while unavailability of standard protocol, legal framework and their implementation are the key chalanges to be addressed. Proper biosecurity measures can significantly influence the financial gain from the aquaculture industry besides limiting the threats of disease outbreak and zoonosis.

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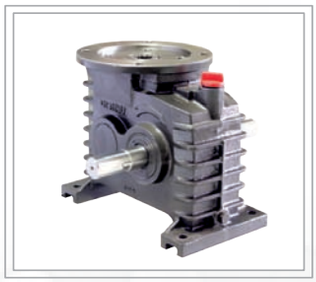

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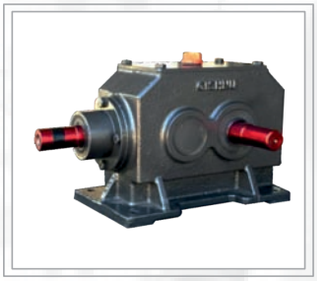

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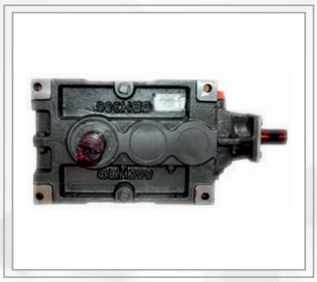

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AQUAMIMICRY: An Innovative Concept for Shrimp Farming

Puja chakraborty[1*], AbhijitMallik[1], Muralidhar P.Ande[2] and Karthireddy Syamala[2]

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[2]Scientist- ICAR-Central Institute of Fisheries Education, Kakinada Center, Andhra Pradesh.

Introduction

Aquamimicry is a concept of creating zooplankton blooms especially copepods,as a source of supplemental nutrition for the cultured shrimps and uplift the growth of beneficial bacteria to maintain optimum water quality, which will simulate the natural estuarine conditions. This is done by fermenting rice or wheat bran as a carbon source,along with probiotics,like Bacillus sp. to release their nutrients. This method is somewhat similar to biofloc technology, but some fundamental differences are there between these two. Firstly, the amount of carbon added is reduced,andit is not strictly reliant on nitrogen input ratios. Secondly, sediments are removed in more intensive systems to be reused by other animals rather than encouraging the growth and suspending high amounts of bioflocs.Ideally, when the water mimics the composition and appearance of natural estuarine water that includes zooplankton and microalgae. Then dissolved oxygen and PH fluctuations are minimized, and there is no need for chemicals and antibiotics because the rice bran provides the nutrition forbacteria and zooplankton (as a prebiotic) to create "synbiotics," which act as dietary supplements that synergistically combine pre- and probiotics.

Origin of the concept

The primary idea towards the development of aquamimicryoccurred in Thailand during the disease outbreaks in the 1990s. It has been noticed that in some extensive shrimpculture ponds the shrimps were growing disease-free, despitebeing near infected ponds. No formulated feeds were given, as the farmers had limited resources. They were only fed with rice bran, and it was thought to be one of the potential reasons for better performance of shrimps in extensive ponds.After extensive trial and errors, over time a protocol slowly developed.When this concept was introduced outside Thailand, many farmers tried this concept in their worst performing ponds. However, within the first batch, production costs were reduced by half, and the practice expanded significantly to more ponds. Currently, some form of this concept is adopted in various countries like Vietnam, India China,Korea, Ecuador,and Egypt.

Pond preparation

By using a filter bag of 200-300 µm, the pond is filled up to 80-100 cm depth, probiotics like Bacillus sp.are added, and the pond bottom is chain-dragged forone week. If lined ponds are used, heavy ropes could be the alternative to prevent tearing theline.Gentle dragging is preferred to enhance mixing of soil with the probiotics and to reduce the development of biofilms that could be toxic to the shrimp. Tea-seed cake (@ 20 ppm) is applied along with fermented wheat bran or rice branto eliminate any small fish or eggs. Fermented wheat bran or rice bran (without the husk) is addedat the rate of 50-100 ppm. In the meantime, full aeration is needed for proper mixing of nutrients and probiotics in the pond and to reduce teaseed cake toxicity levels.

Preparation of Carbon source

A complex carbon source, such as wheat bran or ricebran, without husk, is mixed with water @1:5-10 ratio,followed by the addition of probiotics under aeration for 24 hours.The entire mixture is slowly addedto the pond. If the mixture is crumbled, the upper "milk" is added to the pond,and the bran solids are fedto thefish in the biofilter pond. The pH of the incubation water should bein the range of 6-7 and adjusted if necessary.Once the shrimpsare stocked@ 30-100/sq.m, the quantity of fermented bran needsto be added depend on both the system and the turbidity level of the water. In general 1 ppm is recommended for theextensive system, while for theintensive system, 2-4 ppm is used. The ideal turbidity (Secchi disk) should be around 30-40 cm. If lower, morebran should be added and it is vice -versa. Additional probiotics should be during the grow-out period addedto promote the formation of biocolloids (flocs composed of detritus, zooplankton, bacteria, etc.). Following 15 days after the pond stocking with shrimps, slowly the pond bottom should be dragged using chains or ropes to minimize the formation of biofilms.

Sedimentation and biofiltration ponds

The sedimentation pond should be 4-mdeeper in the center and 2-mdeeper on the edges than the grow-out pond to allow the sediment accumulation. In this, bottom-dwelling fishes such as catfish or milkfish, depending on the salinityof the water– should be stocked at low densities. They will stir up the detritus which will help toclean the pond system, and the fish can be provided as food for farm workers.The sediments from the grow-out pond will stimulate the production of worms and other benthic invertebrates that the fish can consume. From the sedimentation pond, the water will flow to another pond and increase the retention time and act as a biofilter. Fish like

Highlight Points

- **The importance of this approach includes ,the decrease in the feed conversion ratio,**
- **Reduction in water exchanges and disease occurrence.**
- **Better overall nutrition of the animal,**
- **Reduce the stress associated with fluctuating water quality,**
- **Minimizing favourable environmental conditions to pathogens.**
- **Implementation of this technique will ensure cost effective and disease free shrimp production and uplift the economic status of the farmers associated with shrimp culture.**

tilapia can be added atvery low densities. From here, water flows back to the grow-out pond (having little nitrogenous waste). Every three years, interval the sedimentation should be cleaned.The current ratio of these ponds is 1:1 (treatment togrowout ponds), which requiresrelatively large areas of the landconcerning production. However, trials are going on to substantially reduce this ratio by adjusting carbon inputs ,water flowsand combinations of different live organisms in the treatment ponds.

Post- harvest

After harvesting, the pond bottoms will not have any odour, accumulated sediments or black soil and the pond is therefore ready for the next production cycle by the addition of fermented bran solution and probiotics, as mentioned earlier. Farmers reported that the shrimpwouldhave a deeper red color when cooked, which may be because of the consumption of additional pigments in the form of natural food produced in the pond.

Prospects

Significant drawbacks to the Aquamimicry approach are

- Applying this concept to indoor conditions is problematic.
- As well as in relatively large treatment ponds implementation is difficult.

Reportedly better-qualityofshrimp can be produced at lower cost and in a sustainable manner, so the concept of Aquamimicry is rapidly expanding throughout the world. Some interpretation of the concept willsurely lead to a new standard in shrimp farming industry.

Summary

Shrimp farming is one of the emerging businesses of India nowadays, and shrimp industry requires high quality feed (needs incorporation of cholesterol, pigments and probiotics). Shrimp and prawn aquaculture industry used to be affected by number of diseases and as a result various health management strategies were developed. Adopting biosecurity and in extreme cases, use of antibiotics and chemicals are some of the common methods. However, by the implementation of the aquamimicry technique, production of natural zooplankton is straightforward, which can replace the pelleted feed, and maintain optimum water quality, which will simulate the natural estuarine conditions. Hence aquamimicry is a potential cost effective means of shrimp production to the farmers.

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More Reference can be provided on request.

Unify : Sea Food Processing plant ERP solution

Cruxzen Technologies, launch a newly ERP solution with cloud accessibility with custom fit features

Unify is ERP software designed and developed solely for primary and seafood-processors, distributors and traders. Unify can manage raw material purchase supply chain, processing operations, and Exports documentation. Unify is already used some of the well-known processing units on west cost of India.

The importance of overview

As fish production becomes more like manufacturing automobiles, where export orders are confirm for entire years. It is increasingly important for management to have good overview of every single step in the production line. To be able to have this supervision, reliable and user-friendly software is a necessity. Unify is able to give overview raw material purchase, yield , stock and export order management. Additionally, it can administer production and planning processes and monitor inventory. The system offers full traceability, from raw materials to final products if the Unify user records all the necessary information. Getting raw material workability is one of simplest feature of Unify. Unify offers free trial for processors and export traders.

Growing demand of Enterprise Resources Planning

With the growing demand of Enterprise Resources Planning in the Sea food industry and with more consolidation on the market, bigger companies and new regulations, the fishing industry needs to be able to implement tractability. With the Unify it is easier to enter data into the software solution. Unify gives an overview of what is going on the production floor. It can connect to other software, such as the commonly use accounting software. This makes it easier to monitor the produce through the production cycle.

Into the cloud

Instead of buying expensive computer equipment to host the ERP solution, Unify offers subscriptions base Software as a Service (SaaS) platform, which is easy to implement and access any time anywhere.

Unify is easily adaptable

One of the perks of Unify is that it is easily adaptable to all types or sizes of companies. With a cloud subscription, a company can increase and decrease numbers of users easily and the cost of installation is minimal since there is no need to buy software licenses or centralized computer equipment. The data is then accessible from all over the world. Total end to end solution Unify offers multiple solutions to the Seafood industry, such as Unify PU, Unify Export.

Unify is sold by Cruxzen Technologies, a leader in sea food ERP software from Pune, Maharashtra.

Summary and Benefits

- End to end Traceability.
- Perfect control on quality of raw material and finish good.
- Accurate data obtained per batch with yield, quality, and cost.
- Data accessibility at anywhere to control on business.
- Easy to install, with no need of capital investments.
- User friendly and maintain product safety with secure production data.
- Manage staff productivity and inventory.
- Online information of in-house present stock and stock value.

Importance of Ornamental Aquatic Plants in Fish Aquarium

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1. INTRODUCTION

Aquatic environments possess unfathomable value and are aesthetically unmatched by any artificial invention. Modern man, trapped in an artificial world, tries consistently to surround himself with even a small part of this natural beauty. An obvious example is an aquarium, decorated to reflect the wonders of the natural environment. An aquarium without plants is like a garden without flowers. Even the highly attractive exotic fish cannot be shown to advantage in an aquarium devoid of vegetation for it is the contrast of varied colors of fishes.

Aquatic plants are a popular commodity in Florida, many of which are produced in-state, primarily in the central and southern regions for the aquarium, water gardening, and wetland restoration markets. Aquatic plants are also produced for smaller niche markets such as biofuels and food products. Thereare many varieties of ornamental aquatic plants andthe market for these is growing steadily.

Hundreds of fascinating and attractive plants are grown in aquaria for beauty and to maintain the quality of water. Also, aquatic plants provide food, shade, shelter and breeding places for many life forms including fish. They are also referred to as hydrophytes or macrophytes. Water gardening and aquaria keeping has gained huge popularity in several countries over the past decadeand are one of the fastest growing segments of a garden hobbyist.

The word ornaments is defined as "an object or feature which adds beauty to the appearance of the object." Whereas Aquatic plants are simply defined as "all seed-bearing plants whose photo-synthetically active parts are permanently or at least for several months each year, submerged in water or float on the water surface." These plants show successful growth in water and have the ability to transport oxygen down to their roots and rhizomes from aerial or photosynthetic tissues.

Aquatic plants mainly used for food, flowers for religious offerings and decorations, medicinal use, ornamental plants, bio-fertilizer and weaving of baskets.International demand, improvement in tank and transportation technology of ornamental aquatic plants has significantly increased Trade of aquatic plants globally.

Highlight Points

Aquatic plants are plants whose photosynthetically active parts are permanently or at least, for several months each year submerged in water or float on the surface of water. Most essentially, they are the addition of a unique filtration system. Aquatic plants have an uncanny ability to remove waste excreted by the ornamental fishes. They also help in the removal of decaying substances. Aquatic plants absorb nitrates through their leaves and through the substrate and also play an incredibly important role in the carbon cycle.

2. HISTORY OF THE INDUSTRY

The cultivation of ornamental aquatic plants has an obscure and undatable origin. It may have arisen as an incidental feature of the very ancient arts of pisciculture and landscape horticulture, which can be traced back to at least 2500 B.C. in Egypt, Assyria,and Persia. Clearer emphasis was placed on the aesthetic value of water plants with the rise of Buddhism when formal lotus pools became an integral feature of the gardens of all Buddhist temples. It was much later that the art of water gardening spread throughout the western world. Popular enthusiasm for water gardening in Britain has grown since 1900,and since World War, I there has also been marked enthusiasm in the USA, South-East Asia,and Russia for the cultivation of ornamental plants for aquarium purposes.

- Due to the magnificent diversity of aquatic environments, South America has been an important source of aquatic ornamentals for the aquarium industry.
- Over 400 species of freshwater aquatic plants have been legally traded in Australia over the last 30 years.
- Both ornamental fish and ornamental aquatic plant exportation began in Brazil by 1930.
- The decline began in South America after the development of mass production in the late 1950s in Southeast Asia, and a few decades later cultivation in South America had practically ended.
- The decline in production was a consequence of the rapid development of aquarium plant cultivation in Asia, U.S.A.,and Europe.
- Europe is the strongest market for aquatic plants
- Currently, a growth in demand has been experienced in the US market.
- Two Echinodorus species were produced in masses in Peruvian Amazonia for international aquarium plant trade from the 1950s to 1990s.
- Nowadays aquarium plant production involves in vitro propagation and other highly sophisticated methods.
- Thus, re-establishing large-scale aquarium plant production in Amazonian countries may not be economically viable

3. CLASSIFICATION OF AQUATIC PLANTS

Followings are four type classified as

1. Sub-merged plants:

Leaves are submerged in the water, may or may not be rooted.e.g., *Hydrilla, Myriophyllum, Ottelia, Ludwigia, Saggitaria, Vallisneria, Cabomba, Ceratophyllum, Utricularia*

2. Emerged plants:

Plants having their leaves and flowers above the water surface but rooted in the bottom.e.g., *Nymphaea, Nelumbo, Nymphoides.*

3. Floating plants :

Plants have their foliage (leaves) above the surface of water with roots hanging free.e.g., *Eicchornia, Pistia, Lemna, Azolla, Salvinia*

4. Marginal plants:

They are growing in the shallow areas of the water body (near shore).e.g., *Typha, Cyperus, Ipomea, Cryptocoryne, Echinodorus.*

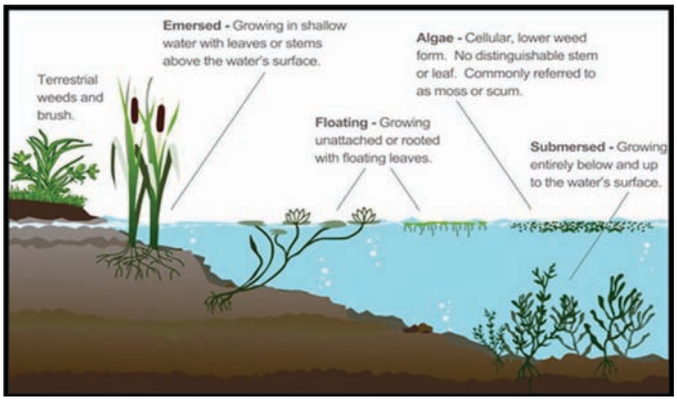


Figure3.1: classification of aquatic plants

4. NAME OF ORNAMENTAL AQUATIC PLANTS

S.NO.	Scientific name	Common Name
1.	Echinodrous spp.	Amazon sword
2.	Eichhorniacrassipes	Water hyacinth
3.	Nymphaea spp.	Waterlily
4.	Ceratophyllum	Hornwort
5.	Ipomoea aquatic	Water spinach
6.	Vallisneria spp.	Tape-grass, Eel-grass, Ribbon-grass
7.	Lemna minor	Duckweed
8.	Pistia spp.	Water lettuce
9.	Aponogeton spp.	Lace plant
10.	Myriophyllum	Milfoil
11.	Acrous	Japanese dwarf Rush

5. IMPORTANCE OF AQUATICS PLANTS

- Aquarium plants give natural look to aquarium.
- They provide food for fishes.
- Herbivorous fishes directly eat the plants while other fishes eat the organisms attached to the leaves.
- Plants are best filters and thus, help to maintain water quality.
- They provide shelter, shade and hiding place for smaller fishes.
- They serve as a spawning site for certain fishes.
- Plants and fishes have a symbiotic relationship.
- The fish waste is used as an excellent fertilizer for plants while plants, in turn, removes nitrate and CO_2 from water.
- Some of the plants are believed to reduce pH of water which is suitable for breeding of certain fishes (like tetra and angel).

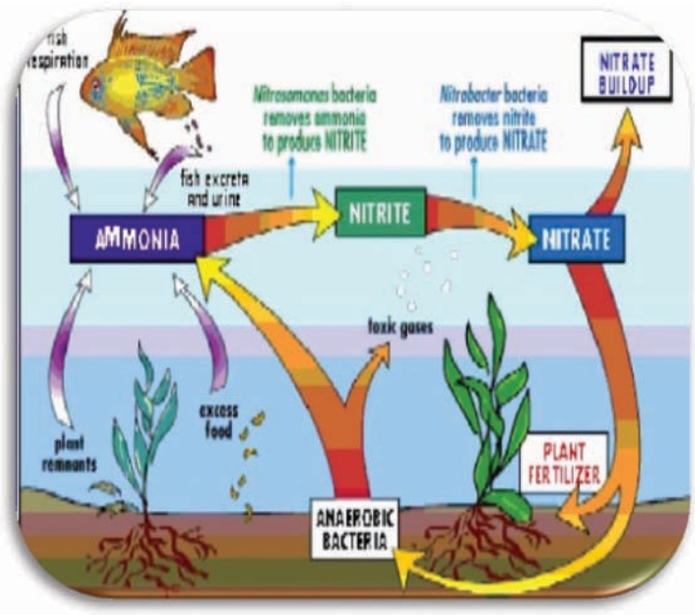


Figure (6.1, 6.2): photosynthesis and nitrogen cycle

6. FACTOR FOR AQUARIUM PLANT

Lighting

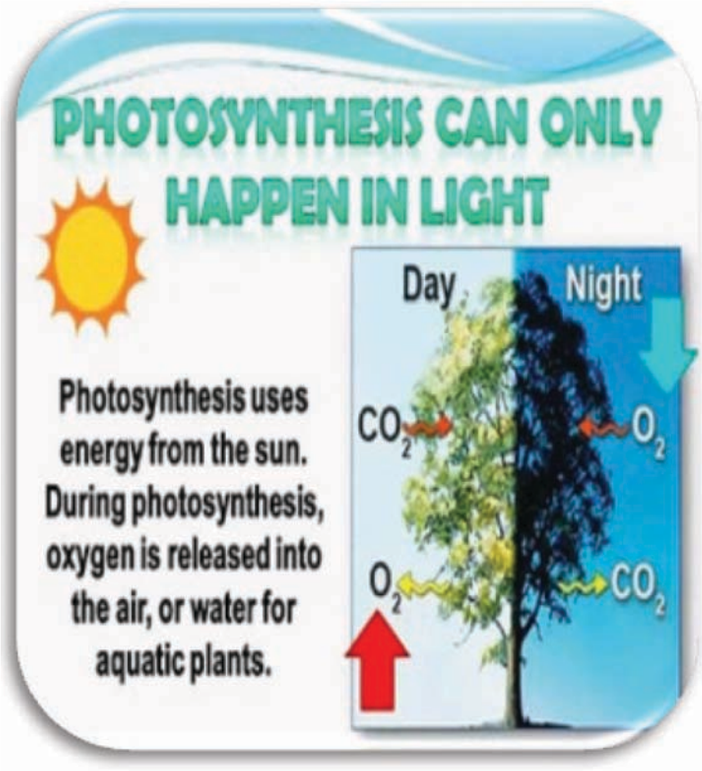
Light is a fundamental requirement for all plants. Light must be provided in the correct wavelength andcolor temperature for plants to photosynthesize, and on for the right durationthroughout the day. As a rough guide, best plant growth will be provided by 0.5 watts of light energy per liter or 50 watts of lighting per 100 liters of water.

Substrate

Proper substrate choice can mean the difference between success and failure with plants. Plants need a substrate to anchor and to take up nutrients, and the substrate needs to be of the right grade and depth to be able to do just that. Fine substrates of between one andfive-millimeter diameter are best, with three millimeters being a good average size. The particle size of substrates is important because too coarse, and nutrients are washed away, and if it's too fine, the gravel can become anaerobic, and the roots will rot. Always make sure that the gravel is ph neutral, or inert, as most plants do not do well in very hard, alkaline water. Layer gravel to a depth of between 5 and 10 cm to enable the plants to send down roots.

Fertilisers

A fertilizer must be added as a nutrient to provide the plants with their food. As good as any sand, gravel or grit is, they are mostly sterile,so they need a substrate fertilizer to allow



the plants to take up nutrients. Liquid fertilizers are meant to top up any deficiencies that may occur in the water. As plants grow, various essential elements may be used up like iron, and the regular addition of a liquid fertilizer can help make up any deficiencies. Add liquid fertilizers on either a weekly or daily basis, or their ease of use and proven results often mean that they are the first tool used to aid better plant growth in any freshwater aquarium. Overdosing may cause algae. Liquid fertilizers are good for when your plant leaves look a little yellow.

Carbon dioxide

Carbon is known as one of the basic building blocks for all life, and when presented to plants in a way they can use, the results can be spectacular. In the daytime, plants absorb carbon dioxide (CO_2) and produce oxygen. They use the carbon that they have absorbed to build their structures and to grow. In the aquarium, CO_2 can be deficient in the daytime as filtration and aeration drive off CO_2 – good for fish but not so good for plants. By adding CO_2 through a diffuser, more CO_2 is available in the water for plants. CO_2 can be added to the aquarium safely by use of a fermentation kit (like theNutrafinsystem) or from a pressurizedsystem (like the Hydor kits). Individual CO_2 bubbles are added to the water in a way that is safe for the fish, and the plants repay us by producing extra oxygen for the fish, fighting algae and soaking up nitrate and phosphate.

7. PROPAGATION

Increase by any process of natural reproduction from the parent stock. In India, aquarium plant propagation is new to entrepreneurs.

1. **Natural collection**
   - The wild collection will lead to ecological stress, hence
   - Artificial propagation will reduce the pressure on the environment.
   - To produce a large number of plants in a short period.
   - To meet the demand of domestic as well as export market for planting material.
   - To preserve/conserve a particular plant or population of plants.
2. **Artificial culture**
   - **a) Sexual Methods of Propagation**
   - **b) Asexual methods**
   - **c) Tissue culture**

1. Sexual or seed Methods of Propagation

The raising of plants using seeds, which is formed due to the fusion of male and female gametes within the ovule of a flower. This method is used when a new plant is grown from a seed or spore.

e.g.,Samolus and cyperus species

ADVANTAGES:	DISADVANTAGES:
• Long-lived plants. • Hardy deep root system. • Very cheap and easy method	• Loss of seed viability. • All plants cannot propagate

2. Asexual methods of propagation refer to the multiplication from any vegetative part of the plant.

- ***Runner cutting:*** Plants with short stem axis form runners, at the end of which young plants develop. Eg.Vallisneria, Sagittaria
- ***Stem cutting:*** Segments of stem axis which are placed in the ground, where they develop roots at the stem nodes. Eg.Ludwigia
- ***Rhizome division:*** If rhizomes are separated from the parent plant, new plants will develop from the dormant buds on them and become separated in the course of time. E.g.,Anubiasand Acorus

Advantages

- Helpful in absence of viable seeds and poor seed germination.

Disadvantages

- Required special skill.
- Hybrid cannot produce

3. Tissue culture

- Plant tissue culture is widely used to produce clones of a plant in a method known as micropropagation.
- Introduction of tissue culture to producethese valuable aquatic plants holds several advantages for industry. It will provide good quality plants without pest or disease at a competitive price for the export market while conserving aquatic plants in their natural habitats.
- Principle: Totipotency and plasticity
- Sterile jelly-like medium is used (agar or similar) containing nutrients and sometimes antibiotics, hormones,etc. to control the plant's growth.
- Mostly Anubiasspecies are produced by this method.

Types of Tissue Culture

- Seed culture, Embryo Culture, Organ Culture and Cell Suspension
- Once the plants have reached a suitable size, they are taken out of the container and hardened in greenhouse conditions.

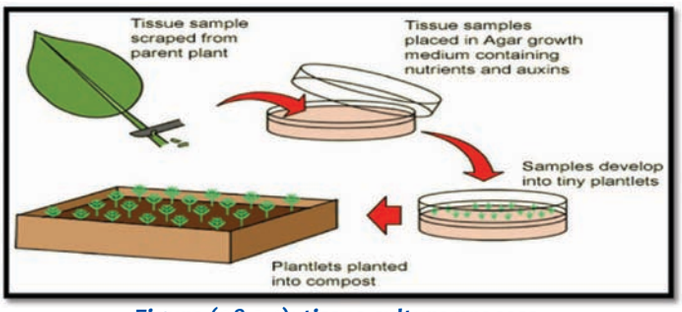


Figure (08.3.1): tissue culture process

8. Aquascaping:

- The craft of arranging aquatic plants, as well as rocks, stones, cave work, or driftwood, in an aesthetically pleasing manner within an aquarium in effect, gardening under water.
- Aquascaping designs include some distinct styles, including the garden-like Dutch style and the Japanese-inspired nature style.
- In aquascaping, many different aquarium plants of suitable varieties are arranged harmoniously to create an aesthetic finish.
- Aquascaping styles for aquariums – Dutch, Taiwanese, Iwagumi, Biotope, Jungle, Nature Aquarium style.

9. CONCLUSION:-

Aquatic plants are widely used in the ornamental trade, including both aquarium plants and the water garden trade. The use of aquatic plants in the ornamental trade is likely to increase, as the level of economic development in the world increases. The use and distribution of aquatic plant species in the ornamental trade should be evaluated by national and global plant protection organizations to determine if regulation is appropriate to protect the native habitats.

- Culture methodology and techniques should be developed for wild and economically important aquatic plant species.
- Marketing of aquatic plants for export to raise the aquaculturists' income.
- Insufficient data on culture and trading pathways of aquatic plants.
- The full spectrum of invasion pathways is necessary for ornamental aquatic plants at a national and global level to implement policy actions.

Marine organisms as a source for commercially important enzymes

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Oceans provide an almost untapped reservoir of various enzymes which might have the potential as biocatalysts activity. Marine microorganisms or fungi, plants or animals, represent sea sources of enzymes, in particular, significant efforts are directed towards extremophiles and also some of the symbiotic organisms from the marine source. Fishes, prawns, crabs, snakes, plants and algae from the marine sources are represented rich sources of biodiversity, although the most current bioprospecting activity is founded on microbial products serves various bioactive compounds.

The complexity of the to the boosted marine environment involving extreme salinity and pressure, low temperature and special lighting conditions, may contribute to the significant differences between the enzymes generated by marine microorganisms with homologous enzymes extracted from terrestrial organisms, leading marine microbial enzyme technology in recent years and the resulting valuable bioactive compounds and other products. Due to their better stability, activity, effectiveness, and tolerance to extreme conditions, the marine microbial enzymes are of particular interest that most of the other proteins cannot withstand to the severe environmental situation. So far archaea, extremophilic bacteria, and symbiotic microorganisms are reported to be sources of most of the fascinating marine enzymes with distinct structure, novel chemical properties, and particular biocatalytic activity. These enzymes are commonly used as pharmaceuticals, food additives and fine chemicals.

In recent years, various research done on enzymes with their special activities that are isolated from marine microbes includes bacteria, actinomycetes, fungi, and other marine

Highlight Points

- **Enzymes extracted from the marine sources are of special features for their unique catalytic properties, stable for the extreme condition, novel stereochemical properties, and solvent stability.**
- **Marine enzymes are reported for producing pure racemic compounds that are not observed in normal catalysis process. Symbiotic microorganisms are the sources of most of the fascinating marine enzymes with distinct structure, novel chemical properties, and particular biocatalytic activity.**
- **These enzymes are commonly used as Detergents, Pharmaceuticals,Food additives, Fine chemicals and Biotechnological research.**

microorganisms, and some products have already been used for various industrial applications. In particular, some marine microbial enzymes have yielded a considerable number of drug candidates.

Detergent industry

Since 1913,Enzymes from marine sources are being used in the detergent industry,and the first bacterial protease containing detergent was available during 1956.

Most essential enzymes in this industry: proteases, lipases, cellulase,and amylase. Certain marine bacteria like Bacillus cereus and Streptomyces fungicidesare known to be the source of alkaline proteases used in detergents. Soluble protease from marine shipworm bacterium has also found its utility in industrial cleaning applications. α- amylase is reported to be extracted from aquatic Streptomyces species D1.

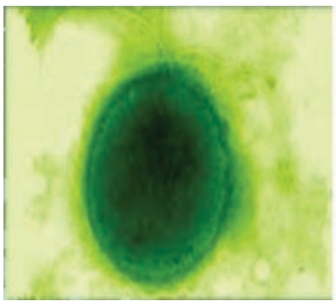
Chemical and pharmaceutical synthesis

Enzymes extracted from the marine sources are of special features for their unique catalytic properties, stable for the extreme condition, novel stereo chemical properties, and solvent stability. Enzymes from marine sources reported producing pure racemic compounds that are not observed in normal catalysis process. Several examples of those type of enzymes can find in the class of lipase, esterase, an oxidoreductase. The enzyme Lipase B extracted from the species Candida antarctica reported as a commercial enzyme with high enantioselectivity,and that is used in the enzymatic acylation of Nelarabin for the production of its 5'monoacetate derivatives, which is an antileukemic agent with higher solubility and thus with better bioavailability in marine sources. The enzyme from C. antarctica lipase B is active in the presence of organic solvents that facilitate their use in catalyzing transesterification process. Enzyme vitamin E acetate has been studied for its potential application for enzymatic synthesis of by the process of lipase-catalyzed transesterification.

Biotechnological research

Enzymes are biochemical catalysts and are well-known tools for various biotechnological applications. DNA polymerases with their thermostable activity that are extracted from marine microorganisms are;

- Thermococcus litoralis(Vent polymerase, New England Biolabs)
- Pyrococcusfuriosus (Pfu polymerase, Stratagene)



The enzyme DNA ligase from the marine isolate Thermus thermophilusis another essential enzyme used for biotechnological research. Several restriction endonucleases extracted from a marine source such as DpaI, AspMD1, DmaI, AgeI, Hsa1, HjaI, Hac1, and Hag1, were isolated from marine bacteria and most of them are already commercially available.

Medical applications

Enzymes can be used as a therapeutic agent for treating a various physiological disorder from digestive problem to neoplastic diseases. High affinity, specificity and the effectiveness of each enzyme to a particular substrate is the primary advantage for their therapeutic applications in the pharmaceutical industry. Collagenases have medical applications in wound healing. Those enzymes areuseful for the removal of dead tissue from wounds, burns, and ulcers, and also which helps in speed up the growth of new fabrics and skin grafts. Collagenase also can inhibit the growth of some contaminant pathogens and is used in combination with some antimicrobial agents. Marine bacteria like Vibrio alginolyticus and Vibrio vulnificus are the source of collagenases. Significant amino acid hydrolyzing enzymes such as asparaginase and glutaminase have potential application towards anticancer agents as a bioactive compound.

There is growing interest in the research field forthe screening of these enzymes for their exploitation of bioactive compound such as anticancer drugs. The marine bacterium Pseudomonas fluorescens is a that produces a salt-tolerant L-glutaminase reported to have antineoplastic activity. RNA serves as sole genetic material in several pathogenic viruses, which can be killed by RNA hydrolyzing enzyme such as ribonuclease. Several ribonucleases from the marine source are being studied for their potential application for the treatment of HIV and other viral infections, but mostly from higher organisms. In the current study, microbial ribonucleases can be studied,and screening of marine microorganisms may open a potential field of antiviral research.

Conclusion

Microorganisms are an extensive and diverse assemblage of organisms which exhibit different morphological, ecological and physiological characteristics. The study of marine microbial diversity is of greater importance since they are the sources of many biocatalysts. Various screening approaches for marine organisms could be developed to increase the ease with which the microbial products can be retrieved. It can be expected that more efficient, effective and significant application of natural microbial products will contribute to the field of medicine, industry and reduction of pollution.

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More Reference can be provided on request.

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The candidate must have a first class MBA or PGDM in Human Resources and a minimum of three years' experience preferably in rural marketing related HR field.

WORK LOCATION:

Gudivada, Krishna District, Andhra Pradesh

Interested candidates may send their latest CV with three references in MS-Word format to the below email address before **15-Dec-2018**:

head.marketing@growelfeeds.com

Growel Feeds Pvt. Ltd.

R.S. No. 57, Chevuru Village, Sriharipuram Panchayat, Mudinepalli Mandal, Krishna District - 521329, Andhra Pradesh

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E-mail : shkhan6677@yahoo.com
E-mail : bwfishcopvtltd@yahoo.com

ISF Trading

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- Survey No.: 50, Olpad Kim Road, At & Po. Olpad, Ta. Olpad, Dist. Surat. M : 98793 39786
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