
RGCA
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2016-17



Rajiv Gandhi Centre for Aquaculture

MPEDA, Ministry of Commerce and Industry, Govt. of India

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RGCA

Annual Report 2016-17

Published by

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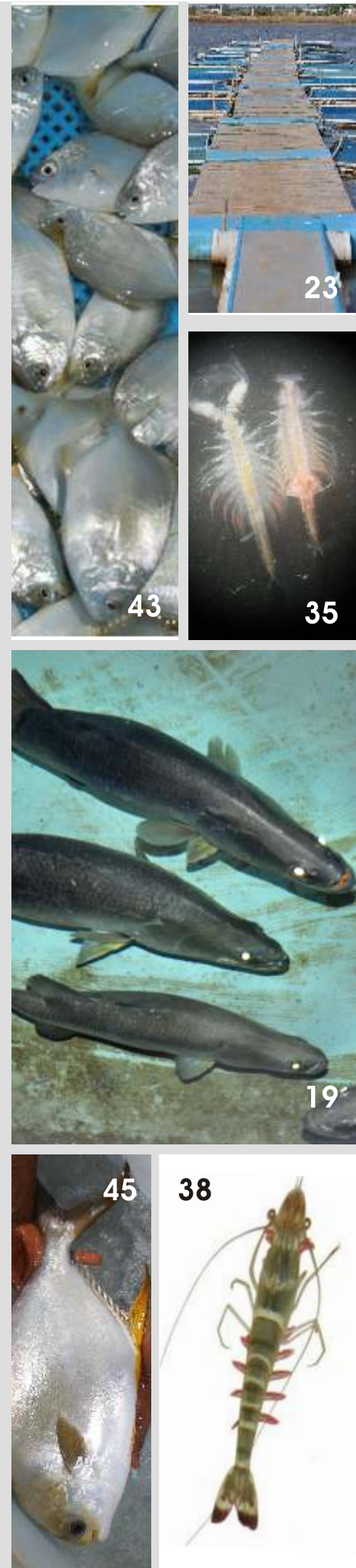
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Dr. A. Jayathilak, IAS

From the President's Desk

From the President's Desk

Greetings from RGCA!

I am delighted to place the progress made by RGCA for the year 2016-17, in the form of Annual Report. The organization has tried hard to live upto its mandate, of developing, demonstrating and transferring commercially oriented research technologies for the benefit of aquaculture sector of the country. Significant accomplishments were made by the RGCA in its flagship projects such as Seabass, Tilapia, Artemia, Aquaculture Demonstration Farm, Broodstock Multiplication Centre for L. vananmei, Marine Finfish Hatchery, and Mudcrab. No doubt, this Research Centre became Aquaculture Technologies Incubation Centre of MPEDA.

The relentless efforts put in by the organization in the Seabass project helped to produce 9.52 million fingerlings. While 4.02 million fingerlings were supplied to private hatcheries from Tamil Nadu, and Andhra Pradesh, 3.02 million seeds were supplied to Universities and Research institutes. The tilapia project

of RGCA also placed commendable results in production as well as in technology dissemination. The project registered a production of 8.1 million tilapia fry with an average survival of 30 % and a supply of 3.02 million all male tilapia seeds to farmers. As a part of institute's mandate to transfer the developed technology, cohorts of GIFT brooders were supplied to the Tilapia Breeding Centre at Krishnagiri, Tamil Nadu and the technical staff of the Centre were sensitized on different aspects of tilapia breeding.

The broodstock multiplication centre for SPF L. vannamei, one among the unique projects of RGCA produced and supplied 39,692 vannamei brooders to approved vannamei hatcheries of the country. An intensive survey was conducted in the commercial hatcheries across the country to assess the performance of the brooders procured from RGCA. Based on the feedback from the industry,

immediate efforts were taken by the project team to address and resolve all the issues raised by the industry. I am sure that, in this regard I would definitely have relevant good results to share with the readers in our next Annual Report.

The quarantine infrastructure of the Centralized Aquatic Quarantine Facility, operated by RGCA was upgraded to high density or premium cubicles that can accommodate and quarantine 25 kg of vannamei brooders/cubicle. The facility was expanded to meet the rising quarantine need of the vannamei industry which has now become very imperative with the industry's expansion and the growing concern of diseases. AQF is now geared up to quarantine 4,12500 brooders/annum. An additional pathogen, the Acute Hepatopancreatic disease/Early Mortality Syndrome was also incorporated into the pathogen screening list of the quarantine

facility with its enlistment as an OIE listed pathogen by the World Animal Health Organization for crustacean diseases. The AQF continued to deliver fairly good quarantine survival rate of 94.87 % of the brooders imported by the hatchery operators irrespective of the broodstock source.

The Technology Transfer Training division of RGCA also etched its achievement by conducting array of outreach and training programmes, including seminars, workshops, on farm-site demonstration trainings etc. Women self-help groups were imparted training on Artemia production and processing at the Artemia Demo Farm of R G C A l o c a t e d a t Ramanathapuram, Tamil Nadu.

The achievements made in all the projects of RGCA are briefed under each project heads of the annual report. While presenting the Annual Report for the year 2016-17, I would like to recall with

satisfaction the commendable support extended to the organization by the Scientific Advisory Committee and the Executive Committee of RGCA. I also thank the Hon'ble Minister of Commerce & Industry, and other senior officials in the Ministry of Commerce & Industry for providing all support to RGCA for all its endeavours. My sincere appreciation to all the RGCA team members for their wholehearted contributions to the progress of the organization. I hope the team continues to strive further to help the organization to excel in the field of commercially oriented aquaculture research, required for the country.

Dr. A. Jayathilak, IAS
Chairman MPEDA &
President RGCA
Date : 30.10.2016

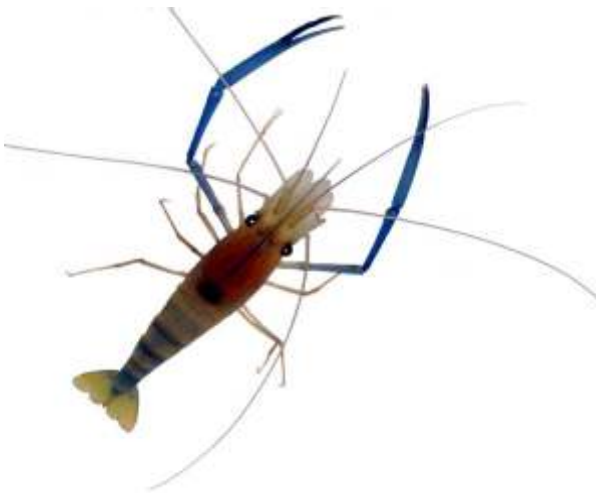


The Organization at a Glance

Rajiv Gandhi Centre for Aquaculture (RGCA) the Research and Development arm of the Marine Products Export Development Authority (MPEDA), Ministry of Commerce and Industry, Govt. of India focusses on commercially oriented research which is required for the aquaculture sector of the country. The centre plays pivotal role in implementing various technology development programmes on export oriented, diversified aquaculture species. The plan schemes are implemented by MPEDA under the head Research & Development. The Centre is, registered under Tamil Nadu societies Registration Act, 1975 on January 5th 1996 and has been functioning as a society since then. The Headquarters of RGCA is established at Sirkali, Nagapattinam District, Tamil Nadu.

RGCA has developed unique state-of-the art infrastructure facilities and expertise to fulfil its mandate on development and dissemination of sustainable aquaculture technologies. The projects of RGCA were implemented with a budget outlay of Rs. 133 crores and Rs. 237.21 crores on 11th and 12th Plan period.

An Executive Committee comprising of members from offices of the MPEDA, MoC & I, ICAR, DBT, Commissioner of Fisheries from the states of Andhra Pradesh, Tamil Nadu & Gujarat; Director of Fisheries of Kerala, Tamil Nadu, Andaman & Nicobar Islands and the U.T of Pondicherry, constitute the governing body of RGCA. The Chairman MPEDA is the President RGCA. Dr. A. Jayathilak is the President RGCA and the Chairman of the Executive Committee.



MEMBERS OF THE EXECUTIVE COMMITTEE, FOR THE YEAR 2016-17

Sl. No.	Name & Organization	Designation & Period
1	Dr.A.Jayathilak, IAS, Chairman, MPEDA	President RGCA, from June 2016
2	Dr. J. K. Jena, DDG, ICAR, New Delhi	Member, April-March
3	Shri P. V. Hari Krishna , Director (EP&MP)	Member, April-March
4	Dr.P.Paul Pandian, Fisheries Development Commissioner, New Delhi	Member, April-March
5	Dr.A.S Ninawe, Sr. Advisor, New Delhi	Member, April-March
6	Dr.K.K.Vijayan, Director CIBA, Chennai	Member, April-March
7	Shri Rama Shankar Naik, IAS, Commissioner of Fisheries, Hyderabad	Member, April-March
8	Smt. Beela Rajesh, IAS, Commissioner of Fisheries, Chennai	Member, April-March
9	Shri Mohammed Shahid, IAS, Commissioner of Fisheries, Gujarat	Member, Up to March-2017
10	Shri J. Chandrasekhar, Director of Fisheries, A & N Islands	Member, April-March

MEMBERS OF THE EXECUTIVE COMMITTEE, FOR THE YEAR 2016-17

Sl. No.	Name & Organization	Designation & Period
11	Shri K. Rengaraju, Joint Director (Inland Fisheries), Chennai	Member, April-March
12	Shri U.S Sajeew, The Executive Director, ADAK, Thiruvananthapuram	Member, April-March
13	Shri. Vincent Rayar, Director, Pondichery	Member, April-March
14	Director (Mktg),	Post Vacant
15	Director, MPEDA	Post Vacant
16	Shri. B. Sreekumar, Secretary, MPEDA	Member, April-March
17	Smt. E. V. Deepa, Chief Accounts Officer, MPEDA	Member, April-March
18	Shri. Y.C. Thampi Sam Raj, Project Director, RGCA , up to "June 2016"	Member, Up to June 2016
19	Dr..S.Kandan, Project Director, RGCA "January 2017" onwards	Member, From January 2017

A Scientific Advisory Committee (SAC) constituted by experts from various fields, at senior level conceptualize and finalize the technical/ scientific programmes involved in various projects of RGCA. The Chairman of the SAC is Dr. E.G. Silas, former Vice Chancellor, Kerala Agricultural University and former Director.

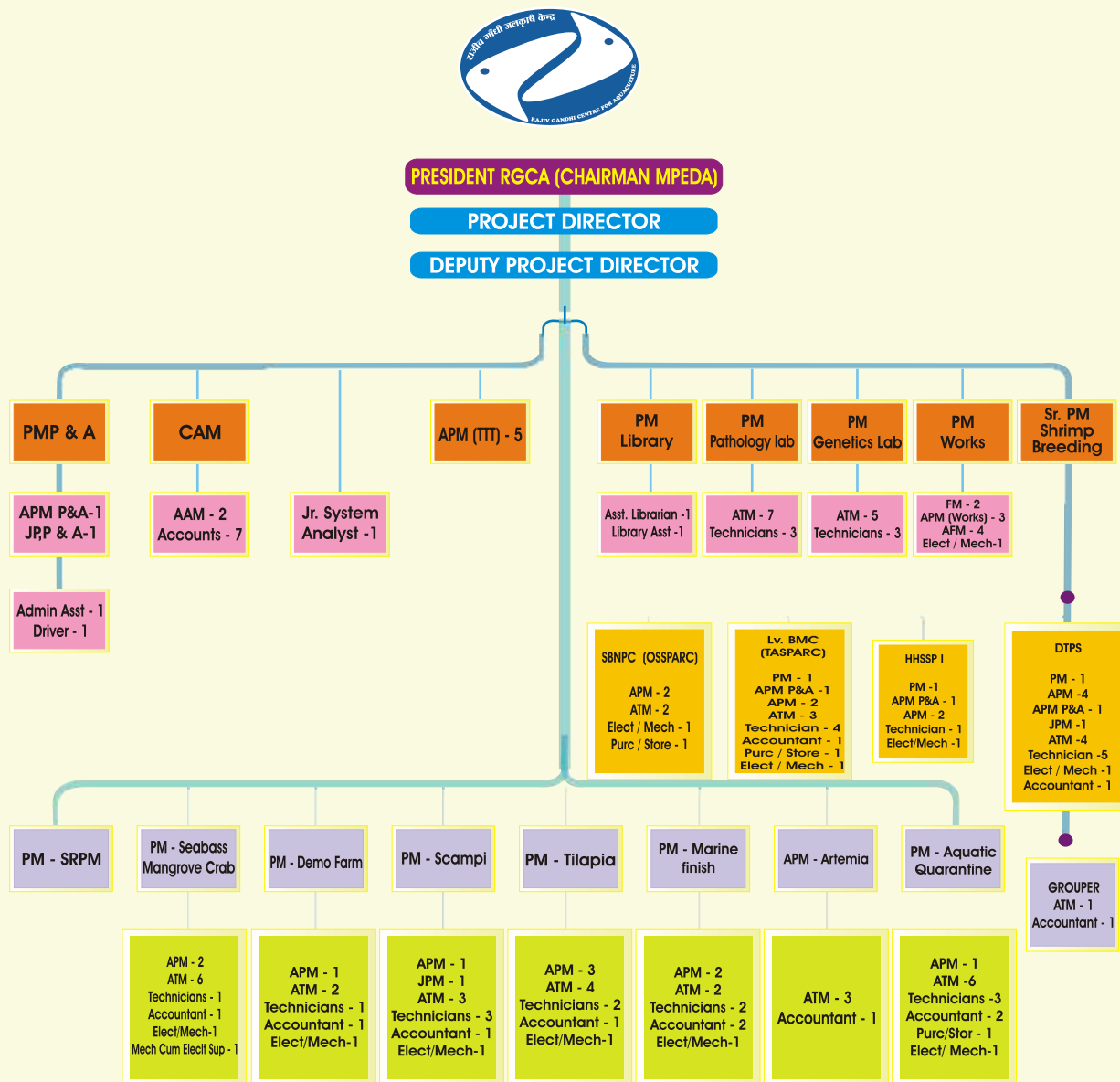
The members of the Scientific Advisory Committee of RGCA are:

MEMBERS OF THE SCIENTIFIC ADVISORY COMMITTEE, FOR THE YEAR 2016-17

Sl. No.	Name & Organization	Designation & Period
1	Dr.E.G.Silas, Former VC, Kerala, Agriculture University & Director, CMFRI, Chairman, Scientific Advisory Committee	Chairman Scientific Advisory Committee, Up to October 2016
2	Dr.George John, Vice- Chancellor, Birs Agriculture University, Jharkhand	Member, April-March
3	Dr.Joykrushna Jena, DDG (Fy), ICAR, New Delhi	Member, April-March
4	Dr.A.S Ninawe, Sr. Advisor, Department of Bio-Technology, New Delhi	Member, April-March
5	Dr. T. Balasubramanian, Dean & Director, CAS Marine Biology, Parangipettai	Member, April-March
6	Dr. A. Gopalakrishnan, Director, CMFRI, Kochi	Member, April-March
7	Dr.T.C Santiago, Retd. Principal Scientist, CIBA, Chennai	Member, April-March
8	Dr. E. Vivekanandan, Retd. Principal Scientist, CMFRI	Member, April-March
9	Dr. A. Jayathilak, IAS, President, RGCA Ex-officio member	Member, April-March, From June 216
10	Director (Mktg), MPEDA - Ex-officio member	Post Vacant
11	Shri. Y.C. Thampi Sam Raj, Project Director, RGCA	Ex-officio Secretary-cum-Treasurer, up to "June 2016"
12	Dr.S.Kandan, Project Director, RGCA "January 2017" onwards	Ex-officio Secretary-cum-Treasurer, From January - 2017



Organizational Structure



CAM - Chief Accounts Manager, Sr.PM - Senior Project Manager, PM-Project Manager, PM - SRPM - Project Manager (Scientific Research Planning & Management)
APM-Assistant Project Manager, JPM - Junior Project Manager FM-Facility Manager,
AFM - Assistant Facility Manager, ATM - Assistant Technical Manager,
AAM - Assistant Accounts Manager



Our mission



- To develop, introduce and disseminate world class sustainable technologies in aquaculture.
- To give consultancy and technical services to the entrepreneurs and farmers for establishing aquaculture units.
- To establish Technology Development Centres in Aquaculture in various locations in India for developing and disseminating appropriate technologies for scientific aquaculture.
- To scale up the technologies developed in research institutes by joining hands with the concerned scientists and disseminate the same through extension, education and demonstration programmes.
- To conduct pilot scale operations and to set up demonstration farms to popularize the technologies developed/acquired.
- To assist National institutes, agencies both in public as well as in private sectors for developing innovative technologies which are having scientific application.
- To introduce proven aquaculture technology of the selected species which are commercially successful elsewhere in the world but not yet introduced in India. The centre will buy the technology from national or international source, blend the same under Indian condition with local technology if available and sell the same to Indian entrepreneurs after assuring the commercial viability.





Ongoing Projects & Locations

RGCA operates 12 important aquaculture projects spread over 21 different specific locations across the country. They are;

- * **Seabass Hatchery Project** Thoduvai, Nagappattinam District, Tamil Nadu
- * **Mud Crab Hatchery Project** Thoduvai, Nagappattinam District, Tamil Nadu
- * **Aquaculture Demonstration Farm**
 1. Karaikal, UT of Puducherry
 2. Mahendrapalli, Nagapattinam Dt., Tamil Nadu
- * **Domestication of Tiger Shrimp Project(DTSP)**
 1. Amkunj, Middle Andamans,
 2. Kodiaghat, South Andamans,
 3. Kanyakumari, Tamil Nadu and
 4. OSSPARC, (The Odisha Shrimp Seed Production, Supply and Research Centre), Gopalpur on sea, Odisha
 5. High Health Tiger Shrimp Seed Production Unit, Chirala, Andhra Pradesh
- * **Scampi Broodstock Development Project**
 1. Kankipadu, Krishna District, Andhra Pradesh
 2. Manikonda, Krishna District, Andhra Pradesh
- * **Artemia Project**
 1. Tharuvaikulam, Tuticorin, Tamil Nadu
 2. Artemia Demo Farm, Uppoor, Ramanathapuram
- * **Broodstock Multiplication Centre for *L. vannamei***

(TASPARC: Andhra Pradesh Shrimp Seed Production, Supply and Research Centre), Vishakhapatnam in Andhra Pradesh.
- * **Tilapia Project** - Manikonda, Krishna District, Andhra Pradesh
- * **Pilot Scale Marine Finfish Project**
 1. Pozhiyur, Thiruvananthapuram, Kerala
 2. Muttom, Kanyakumari district, Tamil Nadu
- * **Grouper Project**
 1. Kodaghat, South Andamans
 2. Sea area of Rutland Island, South Andamans
- * **Technology Transfer Training and Administrative Complex** - Sirkali, Nagapattinam District, Tamil Nadu. The Head Quarters of RGCA functions from this complex
- * **Aquatic Quarantine Facility(AQF)** for *L. vannamei*, Neelankarai, Chennai, Tamil Nadu.

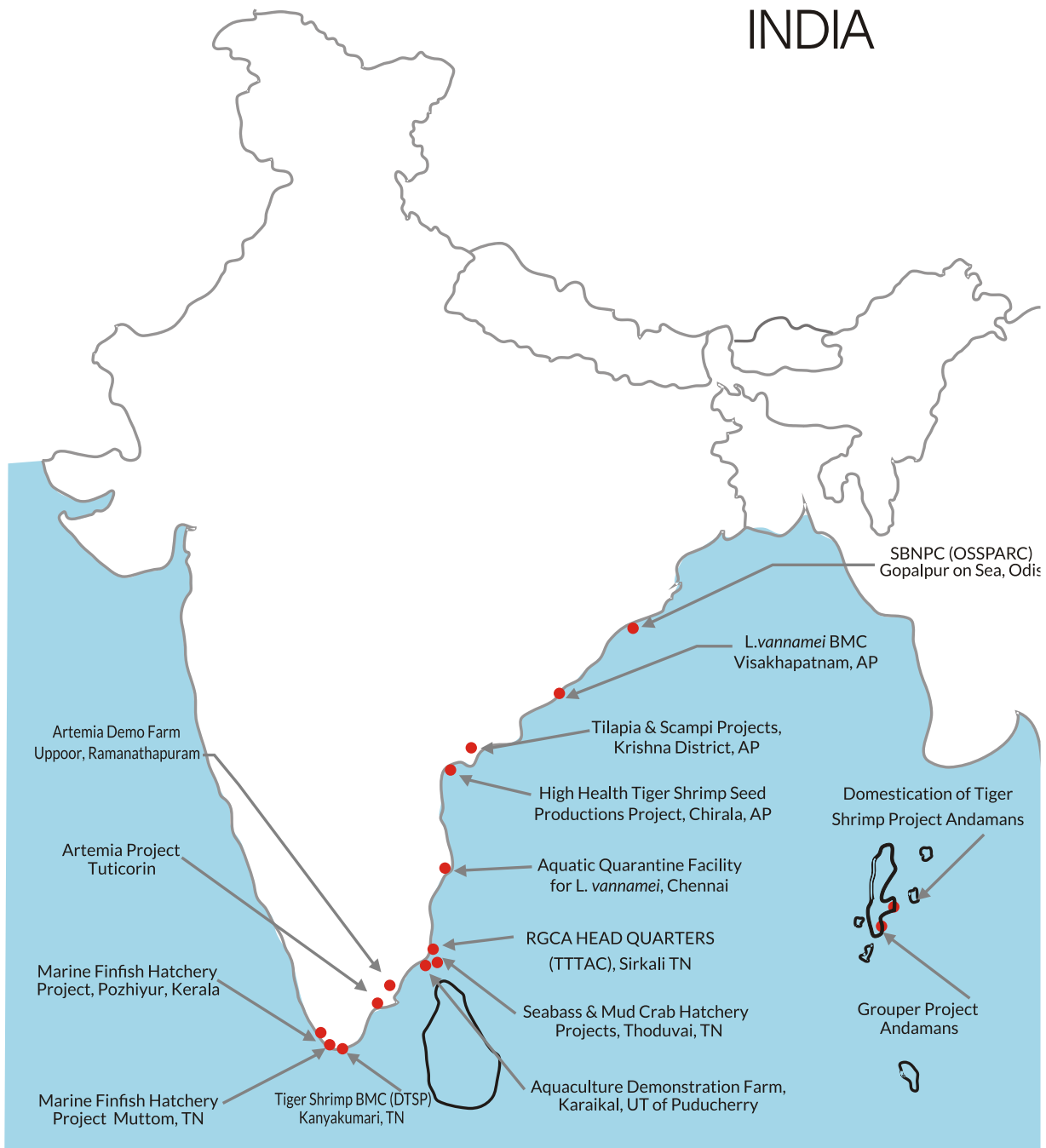
Full addresses of the above locations, please see page 140



RGCA

Project Locations

INDIA





Executive summary

Rajiv Gandhi Centre for Aquaculture (RGCA), the R & D arm of MPEDA, is known for applied research activities and devotes serious sustained efforts in developing commercially oriented aquaculture technologies. The Centre focusses on resolving the immediate technical issues or problems faced by the aquaculture sector of the country through development and implementation of cutting edge research technologies. The research activities undertaken by the Centre is prioritized on the basis of export value of the species, its potential to enhance the livelihood status of the coastal community through societal development, species diversification and its sustainability. The Centre operates eleven projects in twenty one different locations across India.

The major accomplishments of the Organization during the year 2016-17 is summarized in the ensuing report.

Significant achievements in year round seed production of Asian Seabass (*Lates calcarifer*) has been recorded for the current review period in the Seabass hatchery project, at Thoduvai, Nagapattinam District. With the Recirculation Aquaculture System (RAS) adequately supported with chillers, ozone generators and automated photo-thermal control systems, the project accomplished production of 9.52 million of Seabass hatchlings. About 4.02 million of hatchlings were supplied to the private hatcheries and 3.02 million were supplied to the research organizations by the project.



Seabass Cage Farming



The Mangrove Mud Crab Hatchery Facility at Thoduavai, Nagapattinam registered production of 67 million of zoea during the period under report. The project supplied 0.69 million of crab instars to various beneficiaries including farmers and research institutes. Development of techniques for captive spawning and mass scale production of blue crab (*Portunus pelagicus*) instars are also underway by the project.

The Domestication of Tiger Shrimp Project (DTSP) facility at Andamans produced an array of *Penaeus monodon* families of high health status from different generation lines. The number of families produced were two, six, one and twenty three from second, third, fourth and sixth generations, respectively. Regular disease surveillance of the stock ensured the high health status of the shrimps produced by the project.

The Scampi (*Macrobrachium rosenbergii*) Broodstock Development Project with its hatchery facility at

Kankipadu Mandal and its experimental farm at Manikonda Village, Andhra Pradesh produced a total of 5,23,000 nos of Scampi seeds during the current review period. The seeds produced were supplied to the farmers as a part of RGCA's mandate to propagate farming of indigenous species. In addition to the distribution of seeds, the project also supplied 2,300 nos. of selectively bred second and third generation of brooders to four private Scampi hatcheries in Andhra Pradesh and Kerala.

The Artemia project facility at Tharuvaikulam continued demonstration of Artemia cyst and Biomass production. Women Self Help Groups (SHG) were identified as beneficiaries and hands on training programme was imparted on artemia production and harvesting technology. A yield of 594.64 kg wet cyst was collected from the farm facility at Tharuvaikulam, Tuticorin and 157.528kg of dry cysts was produced by the project. The project also supplied 437 kg of WSSV free frozen Artemia Biomass

to the shrimp hatcheries, ornamental fish breeding units and research organizations , during the period under report.

The Project on Brood stock Multiplication Centre (BMC) for *L. vannamei* (Pacific White Shrimp) supplied 35692 nos. of Specific Pathogen Free (SPF) broodstock in 48 batches to CAA approved *vannamei* hatchery brooders during the period under review. The facility also had taken efforts to improve the reproductive performance of the produced stock, further in collaboration with the experts from the Oceanic Institute, Hawaii (OI). In addition to this, the facility also imported 60000 nos. of PL from OI for production of SPF *P. vannamei*. This would minimize the importation of brooders from overseas and serve the industry to grow and sustain on the *vannamei* brooders produced by the country.

The Tilapia Project Facility at Manikonda Village continued mass production of all-male Genetically Improved Farm Tilapia (GIFT) seed and supplied to several Fisheries Departments, Universities in Tamil Nadu, Maharashtra and Kerala for field

trials and Farm Demonstration Activities. The project successfully produced 8.1 million tilapia fry from a quantity of 27 million eggs with a hatching rate of 29.8%, during the current review period. The project also recorded supply of 3.02 million all male tilapia seeds to the farmers and government fisheries departments of different states. The cage rearing of tilapia done in Kandaleru dam yielded 89 % survival on 215 day of culture (DOC) with mean FCR of 1:1.7.

The Marine Finfish Hatchery Project Facility at Pozhiyur, supplied 12050 Cobia fingerlings and juveniles to various research organizations and State Fisheries Departments for their research and pilot cage farming activities. Live cobia juveniles of size range 1.6 2.6 kg were also harvested from sea cage farm of RGCA and supplied to a research organization at Mandapam.

The Grouper (*Epinephelus* spp.) project in Rutland, Andamans maintained brooders of Tiger grouper, Mouse grouper, Squaretail coral grouper and Orange spotted groupers.

The project also successfully produced F1 generation of tiger grouper and orange spotted grouper brooders for the breeding programme. Continuous captive spawning of tiger groupers were obtained by the project, except during the months of April and May, when the water temperature was recorded to increase.

The Technology Transfer and Training Centre (TTAC) also efficiently played its role in technology dissemination to the farming community of the Nation. The centre conducted a series of training, workshops and familiarization programmes on various aquaculture topics on which RGCA had developed technologies on Mangrove mud crab culture and Seabass Husbandry practices. One day workshop on "Shrimp Diseases and its Preventive Measures" was also held for the benefit of farmers. During the current review period, the TTAC conducted thirty four familiarization programmes on the "Latest Trends in Aquaculture practices of Cobia, Seabass and Mud Crab Aquaculture as well as on all new R & D activities carried out by RGCA". About 767

participants comprising of students, staff, Govt. officials, fisher folk, Self Help Group's and farmers benefitted through these programmes.

A five day intensive hands on training cum workshop on "Application of Molecular Markers in Fisheries and Aquaculture" was also conducted by TTTAC in collaboration with the team from the Central Aquaculture Genetics Lab (CAGL), for the benefit of student community and scientific fraternity. A day training programme on field level disease diagnosis, sample and sampling procedures were provided to officials of Dept. of fisheries, NaCSA & MPEDA from Odisha, West Bengal, Andhra Pradesh at Vijayawada & Cochin, was also conducted.

The Central Genetics Laboratory (CGL) pursued selective breeding programmes for the benefit of various projects of RGCA involved in culture activities. The lab also rendered sequencing services of aquaculture samples, to research organizations.

The Central Aquaculture Pathology Laboratory (CAPL) of RGCA continued to serve for the

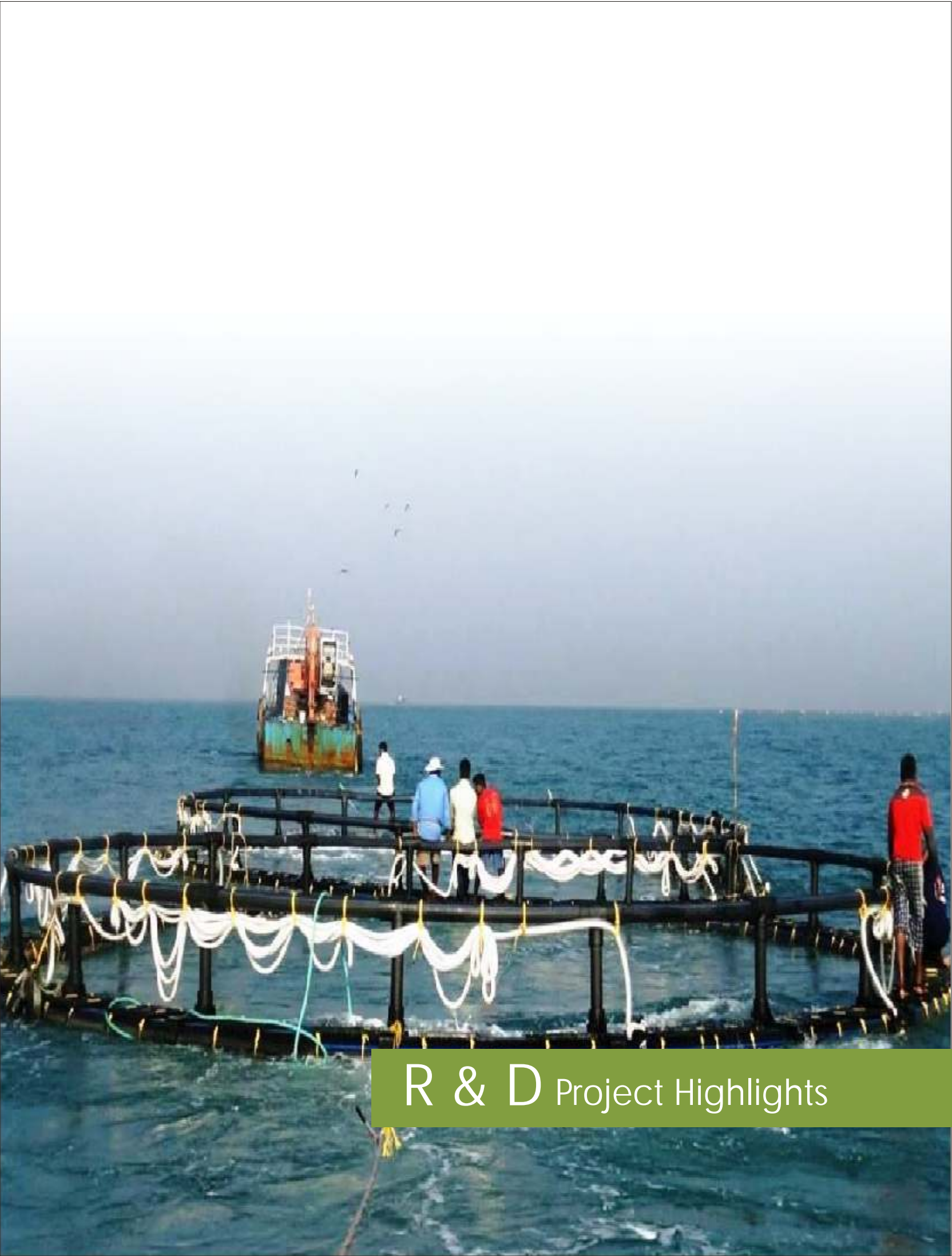
industry by offering its quality diagnostic services. The lab screened 1670 samples and conducted 13251 PCR tests, during the report under review. The microbiology lab received 6084 samples and performed 5613 tests for bacterial pathogens identification and 5154 tests for water quality analysis. The lab also conducted screening of OIE listed pathogens in 3276 shrimp specimens through confirmatory histopathological tools. Under NSPAAD Surveillance, 207 Samples from 180 farms in Tamil Nadu and 110 samples from 109 farms in Odisha were also collected and analysed for the pathogens WSSV, TSV, YHV, IMNV, AHPND and EHP.

The Aquaculture Reference library of RGCA also augmented its literature resources, during the period under report by addition of 137 books which are latest in the field of Aquaculture and allied subjects.

The Aquatic Quarantine Facility (AQF) for *L. vannamei* scaled up its quarantine carrying capacity in line with the increased number of *P. vannamei*

hatcheries. All the twenty quarantine cubicles of the facility were upgraded to accommodate maximum biomass of 25 Kg. of brooders, during the period under review. The PCR lab of AQF also included an additional pathogen, causing the disease, the Acute Hepatopancreatic Necrosis (AHPND) in addition to the existing six pathogens that are routinely screened in the lab. The facility quarantined a total of 204726 numbers of *vannamei* broodstock imported in 284 batches by CAA approved *vannamei* hatcheries from 7 different broodstock centres. The quarantine survival achieved during the period under review was 94.87%. All the samples received during this period was ensured as Specific Pathogen Free (SPF) stock.





R & D Project Highlights



Seabass Hatchery Project

Project Location : Thoduval, Sirkali, Nagapattinam District,
Tamil Nadu

Year of Commencement : 2000

Scope of the Project

This project is one of the commercially oriented research projects of RGCA that aims to support local aquaculture production and species diversification. The seabass hatchery project was initiated to fulfil the Organization's mandate of sustainable utilization of aquaculture resources. The project ensures year round supply of Asian seabass (*Lates calcarifer*) seed to the aquaculture industry for augmenting aquaculture production mainly through cage farming in earthen ponds, open water systems, marine cages and coastal waters.

Description of the facility

The facility is located on a 13.2 acre area at Thoduval village, Sirkali Taluk, Nagapattinam District. Dedicated sections for Quarantine, Broodstock housing Spawning, Larval rearing, and Fingerling rearing areas are present. The fully operational live feed unit in the facility ensures the production and supply of Micro algae, Rotifer and Artemia required for seabass hatchery operation. The facility is infrastructurally equipped with supporting systems such as seawater intake and treatment components, fresh water intake systems, reservoirs, overhead tanks, filtration, aeration



Out Side view of Seabass Hatchery Unit of RGCA



Broodstock housing tanks with Seabass brooders

and power back up systems. . The annual seed production capacity of the hatchery is 2-3 million seeds (2 cm size) per year.

Activities & Accomplishments

The summary of the project activities recorded during the current review period were as detailed below:

Broodstock Collection & Quarantine

Brooders were collected from the wild, quarantined and recruited into the existing hatchery maintained broodstock, population. During the current review period, a total of 5 brooders were recruited from the wild and the total stock maintained in the facility was 55 nos, after due quarantine of forty days.

The ectoparasites, flukes etc are removed from the wild brooders by bath treatments during the quarantine period and introduced in to the broodstock housing section. The quarantined stocks were maintained in broodstock housing tanks fitted with Recirculation Aquaculture System (RAS that facilitates optimum water quality conducive for Extended Maturation Phase (EMP).

Breeding and Seed production

Six successful spawnings were achieved during the review period. The quantity of hatchlings produced were 9.52 million and out of these, 4.02 million hatchlings directly supplied to private hatcheries from Tamil Nadu, Andhra Pradesh and remaining hatchlings were stocked in Larval Rearing Tanks, in which, a total of 3.02 million seeds (fry & fingerlings) were supplied to the farmers, Universities, Research Institutes, Fisheries Departments, ICAR organizations, MPEDA and RGCA Demonstration programmes. The survival rate of hatching stocked in LRT Section of hatchery was recorded as 55%.

Supporting systems in the hatchery:

The hatchery improvised the supporting systems by addition of heaters, chiller units, ozone generators, which facilitated easy conditioning and spawning in captivity. Dedicated oxygen distribution lines for seed packing were also installed,



Larval rearing section to Seabass hatchery

Spawning and Larval Rearing:

Spawns occurred	:	6 batches
Total Production (Hatchlings)	:	9.52 million
Hatchlings sold to private hatcheries	:	4.02 million
Hatchlings stocked in LRT	:	5.5 million
Seeds (Fry/Fingerlings) supplied	:	3.02 million
Survival rate in LRT	:	55 %



Bio filtration systems for Seabass brood stocks

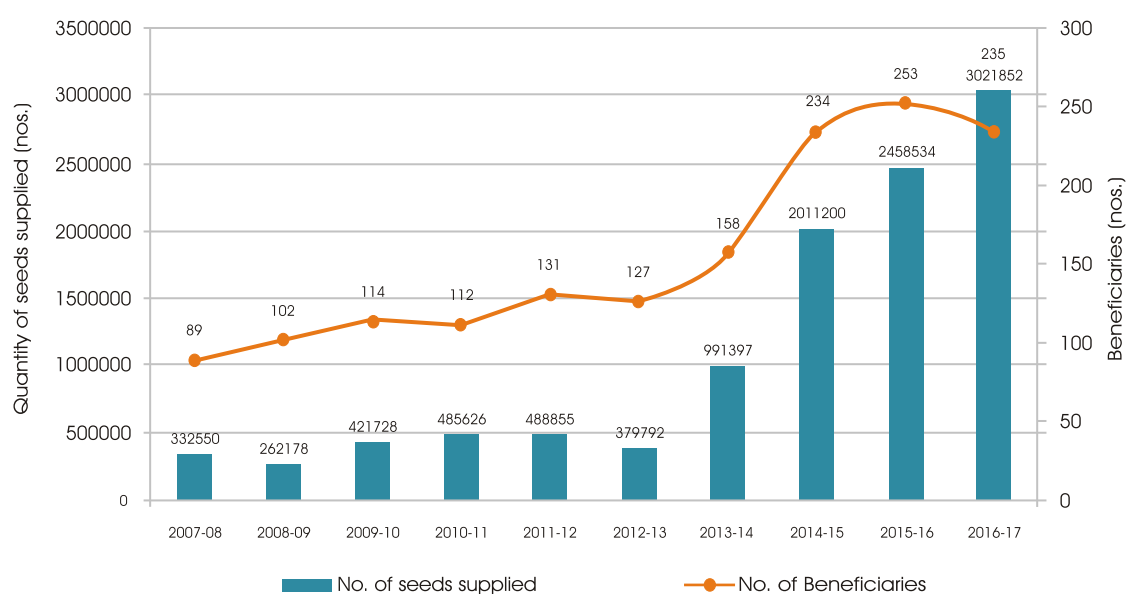
Supply of Seabass Seeds

The facility supplied Seabass seeds to nine states in the country, with a percentage increase in seed supply by 18.5% over the previous year. The beneficiaries included farmers, private entrepreneurs, Research organizations and

representatives from Govt. and non-govt. bodies. The details of seed supplied by the hatchery to various states of the country are provided in the table below

Category	Tamil Nadu	Andhra Pradesh	Kerala	Karnataka	Maharashtra	Haryana	Telangana	Total
Farmers	173545	1623983	190801		50720	15000	24780	2078829
Government Organizations			267625		17000			267625
NGO/Pvt. Company				100000				117000
Universities/ Research Institutes	2350							2350
RGCA	432355		3000					435355
CMFRI	4120		26573	90000				120693
Total fry/fingerlings	612370	1623983	487999	190000	67720	15000	24780	3021852
Total Hatchlings	1000000	3029600						4029600

Category wise supply to Seabass seeds



Year wise Seabass seeds supplied from RGCA hatchery



Mud Crab Hatchery Project

Project Location : Thoduvai, Sirkali, Nagapattinam District,
Tamil Nadu

Year of Commencement : 2004

Scope of the Project

The Project envisages to enhance the culture production of Mangrove Mud crab (*Scylla serrata*), which has high market value in the international trade and domestic markets. It also aims at refining the seed production technology and replenish the wild population by sea ranching of hatchery produced seeds

Description of the facility

The hatchery for Mangrove Mud Crab established by RGCA is the only one of its kind in India. The annual production capacity of the hatchery is one million Crab instars per annum. The hatchery is infrastructurally equipped with designated areas for broodstock housing, spawning, larval rearing and live feed production.

Activities & Accomplishments

Details of Broodstock collection, quarantine, Spawning, hatchling, seed (crab instar) production and supply for the period under review are furnished below:

Collection and Quarantine of matured crabs

The current review period recorded wild collection of 124 matured female crabs of the size range 550 to 850 gms, from Tamil Nadu and Andaman & Nicobar Islands. Four nos. of gravid females were also obtained from the Pitchavaram mangrove areas. The crabs were quarantined and conditioned for seed production. Before stocking for seed production, the crabs were ensured free of the virus White Spot Syndrome (WSS).



Mangrove Mud crab hatchery facility at Thoduvai TN

Spawning and Hatching

About fifty seven successful spawnings were obtained during the current review period. The larval production registered was 67 million which were obtained from 44 spawners. Out of these, 17 million healthy zoea were stocked for larval rearing and the remaining 50 million were ranched into the nearby open sea and estuary.

Seed Production

A total of 44 successful batches were obtained from the hatchery, in which the maximum survival rate achieved from one batch of larval rearing (from zoea to crab instar) during the year was around 10.16%. The steady increase in survival rates over the years provides ample scope for

viable commercialization of crab hatchery seed production. The project accomplished 6.96 lakhs of crab instars (crab seed) of size range of 0.4-0.6 cm.

Spawning and Larval Rearing:

Spawns occurred during 2016-17 (Nos)	: 79
Hatchings obtained (Nos)	: 44
Zoeae Obtained (Nos)	: 67 million
Zoeae Stocked (Nos)	: 17 million
Zoeae Ranched (Nos)	: 50 million
Crab Instars supplied (Nos)	: 0.69 million
Survival rate (%)	: 4.06%

Category	Tamil Nadu	Andhra Pradesh	Kerala	Karnataka	Maharashtra	West Bengal	Orissa	Total
Farmers	48148	218570	54330	20000	2000	5000	5100	353148
CIBA, Govt. Organizations	5000					10200		15200
ADF, RGCA	313255							313255
UNDP Mangrove Pen culture Project					15000			15000
Total	366403	218570	54330	20000	17000	15200	5100	696603

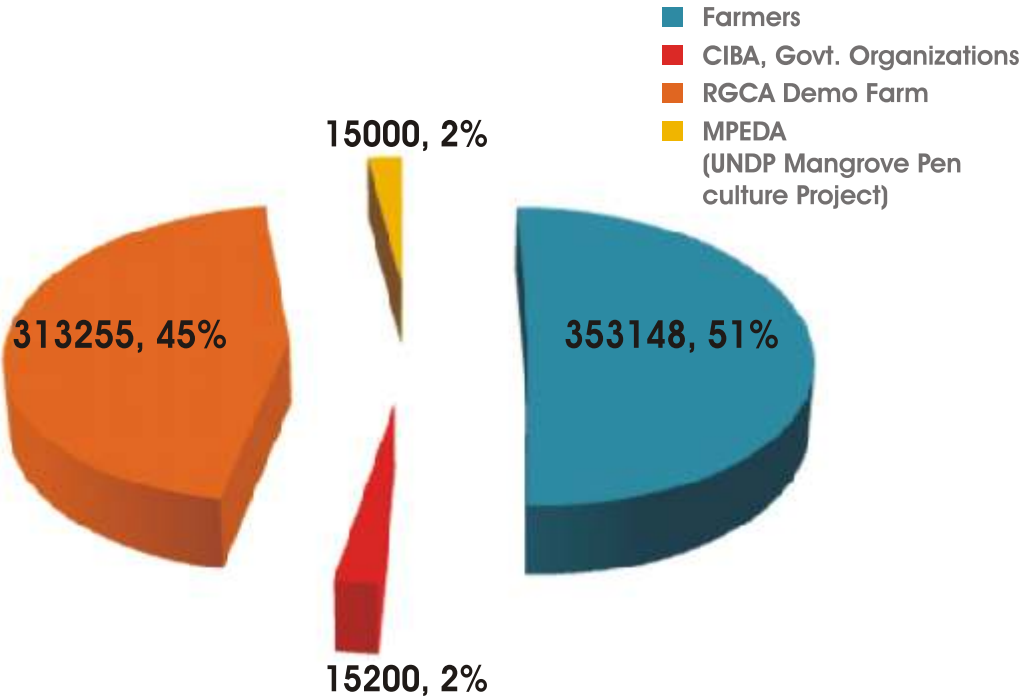
State wise supply of Crab instar

Promotional supply of Crab instars

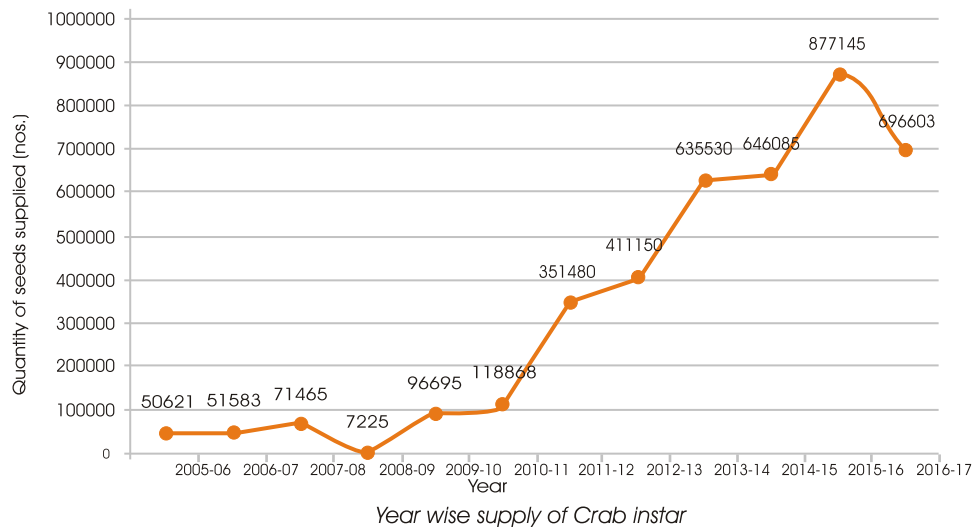
A total of 6.96 crab instars were provided to farmers at a subsidized rate of Rs.6/-. The total amount realized against sale during the review period was Rs.33,13,603.

Category	Number of Instars Supplied (Lakhs)
Farmers from the States of Andhra Pradesh, Tamilnadu, West Bengal, Odisha, Kerala and Maharashtra	3.83
Aquaculture Demonstration Farm of RGCA, Karaikal for Nursery rearing	3.13
Total	6.96

Category wise supply of crab instar



Category wise supply of Crab instar from the RGCA hatchery



Production of Blue Swimming Crab (*Portunuspelagicus*)

Seeds of blue swimming crab were successfully produced in captive condition, by the RGCA crab hatchery. After successful larval rearing, the crab instars were transported to RGCA's Aquaculture Demonstration Farm, Karaikal for further nursery

rearing. The initial trial revealed that *P. pelagicus* has immense potential to be used as an excellent candidate species for farming in earthen pond systems. At hatchery level, this species has been found to have a faster and shorter larval period when compared with the mud crab, *Scylla serrata*.



Megalopa and crab instar of Blue swimming crab



Blue Swimming crab reared from Aquaculture Demo Farm unit of RGCA



Aquaculture Demonstration Farm

Project Location : Karaikal, UT of Puducherry

Year of Commencement : 2000

Scope of the Project

This project focusses to conduct demonstration and outreach programmes of improved culture technologies that RGCA has developed for commercially important fish and shell fish. The Aquaculture Demonstration Farm facility extends support to the farmers and interested entrepreneurs through demonstration of viable technologies in nursery rearing and grow-out farming of Asian Seabass and mangrove mud crabs in different farming systems such as earthen ponds, hapas, pens and open ponds.

Description of the facility

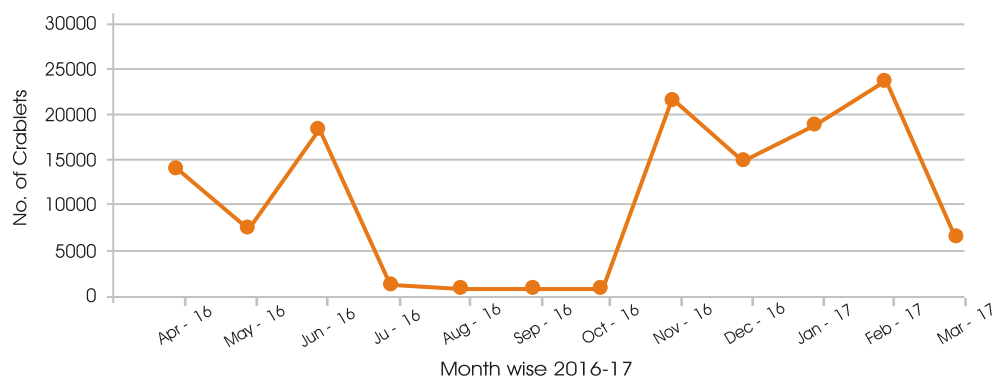
The Demo farms allocated in Karaikal and Mahendrapalli are utilized for conducting demonstration programmes.

Activities & Accomplishments

The current year registered a total of eleven and six training programmes, conducted on Mangrove mud crab and Asian Seabass, respectively. Overall 224 members participated and got trained from the demonstration programmes.

Nursery rearing of crabs & supply of crablets: Crab instars of approximate size 3.0 - 5.0 mm produced from the RGCA crab hatchery were reared to crablets in nursery hapas deployed in the demonstration farm. The quantity of the larvae received was 2,76,360 nos., produced from 22 nos. of larval production runs. The survival rate obtained on rearing from crab instars to crablets was 59%. Of these, 48% (1,32,865 nos) of the crablets were distributed to farmers, Self Help Groups (SHGs), MPEDA Demonstration programmes and Research institutions. The crablets were supplied to the farmers from the neighbouring states such as Tamil Nadu, Andhra Pradesh, Kerala, Goa, Odisha, Maharashtra and Puducherry without much transit loss. A small quantity (1230 nos) of the reared crablets were also placed in the soft shell boxes for soft shell crab production study.

CABLET SUPPLY 2016-17



Mangrove crablets supplied from Demonstration farm, Karaikal



Removing of Crablets from Hideout



Graded Different sizes of Crablets

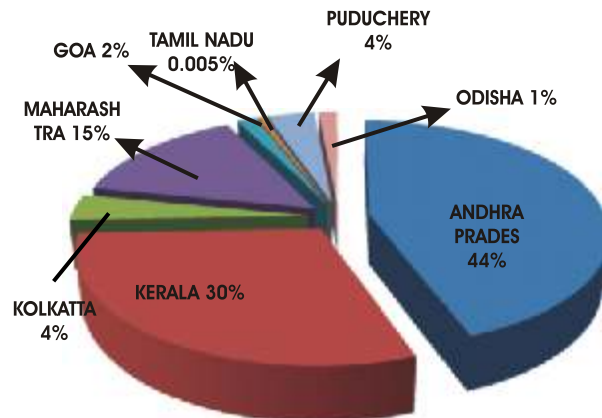


Crablets Packing



Crablets Packed for Sale

CRABLET SALE (STAT WISE)



Supply of Crablets from the RGCA demo farm at karaikal

Grow-out farming of crabs with Artificialdiets

Trials on mangrove crab farming with artificial pellet diet with 38 -40% of protein content was repeated by stocking crablets at a density of 0.5 nos./m² in 0.75 ha pond. The crablets, approximately 3000 nos were stocked in the ponds during October 2015. Regular assessments on growth, feed intake and water quality etc. was done throughout the farming period in which feed stability and feed acceptance was found to be good. Pellet feed was used for the first 9 month periods of culture and trash fish for the subsequent seven months. After a farming period of 16 months, about 323.59 kg (785nos) of crabs of size range 350 - 1.2kg were harvested from the pond system.



Mud crab harvest by trap net



hand picking



Tide fed Soft shell crab pond



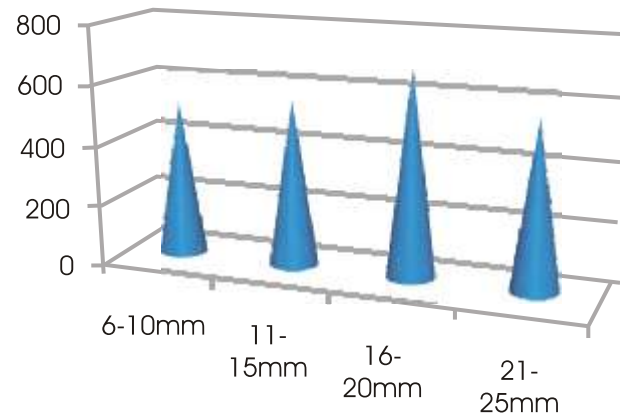
Moulted soft crab

Trial Farming of Soft shell Crab Farming :

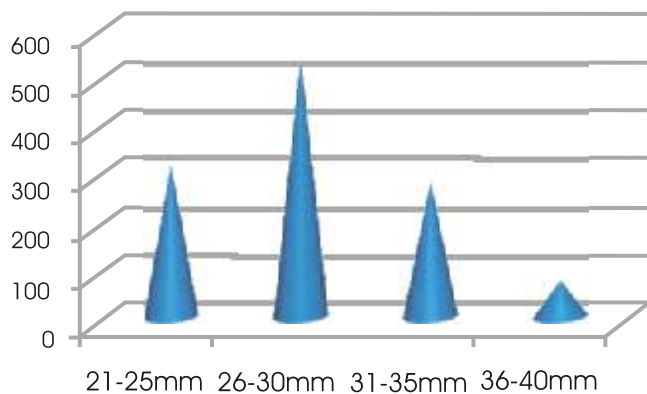
For the purpose of soft shell crab farming, different sizes of crabs were stocked in crab boxes arranged in rows in tide fed ponds. The sizes selected were juveniles <50 gms (875 nos.) and >50 gms (1925 nos.), totalling to 2,800 nos. Of these, 2,293 crabs molted and regular observation is being done. The quantity of crabs that molted was in the range of 12-20 Nos. For the grow-out demonstration of crab farming, about 820 nos of mud crabs ranging in size 150-200 gms were released into Pond # 1 for grow out demonstration.

Nursery rearing of Blue Swimming crab (Portunus pelagicus)

The crablets of the species blue swimming crabs were procured from the RGCA hatchery and stocked in the demo ponds at Karaikal, for nursery rearing. About 2500 nos of blue swimming crabs were reared in nursery ponds to a size of 0.6 to 2.5cm with 84.7% survival in the first grading. In the second grading 2.1 to 4.0cm size crabs, at a survival of 51% survival was obtained within 30 days culture period.



Survival and size variation of Blue swimming crablets in first grading



Survival & Size variation of Blue swimming crablets in second grading



Graded blue swimming crablets



Blue swimming crab



Grading of Seabass fingerlings



Harvested Seabass packed in ice

Demonstration of Cage farming of Asia Seabass (Latescalcarifer):

Nursery reared early fingerlings (4200 & 1800 Nos.) were stocked in Grow-out cages during the end of March `16 in 2 batches. These attained a size range of 200 - 350 gms. About 2,700 nos. of fingerlings were released into an open pond with an estimated biomass of 1.2 M.T and the remaining fish were maintained in 12 Cages. Similarly, 5000 Nos. of early fingerlings were stocked during the month of October `16 and were shifted to grow out culture. The size attained by the fish was 150- 250 gm.

Co-culture of seabass and mud crab in open pond systems:

An experimental study on the influence of co-culture of seabass and mudcrab on growth and survival was conducted in the Aquaculture Demonstration Farm at Karaikal. For this, about 820 nos. of crabs in the size range of 150-200 g, were stocked in an open pond system, in 3-4 batches, along with 2170 nos. of 200 - 350g of Seabass fingerlings. Water quality parameters were monitored regularly. Pellet feed was used as feed for rearing the fish and trash fish for mudcrabs. Co-culture trials were performed with a view to enhance the income generated by the farmers as income would be generated from the sale of fish and as well as the crabs.

Aquaculture Demonstration Farm, Mahindrapalli (a) Asian Seabass Nursery in Hapas :

Nursery rearing of Asian Seabass in HDPE hapas were carried out by stocking early fry (8 - 12mm size) in 2 ponds at Mahindrapalli . From RGCA Seabass hatchery 2,68,225 Fries were obtained and stocked in 5 batches. Fries of seabass were reared for the period from 33 - 53 days depending upon the requirement of the farmers. The period under report recorded supply of 87215 early/late fingerlings (2.6 - 7.5 cm.) to beneficiaries, that comprised of farmers from AP, Kerala, Karnataka, Maharashtra and Tamil Nadu. The seeds were supplied to about thirty-nine nos. of farmers.

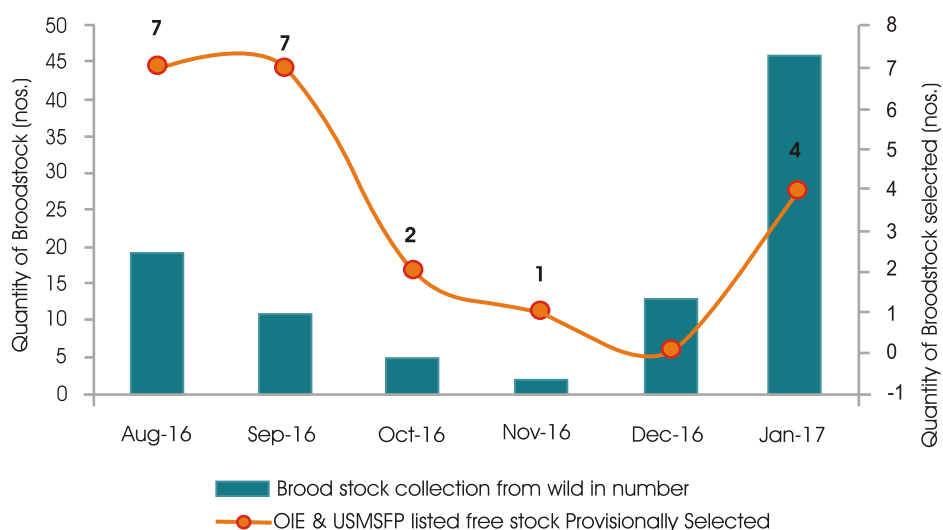


Domestication of Tiger Shrimp Project

The Domestication of Tiger Shrimp Project comprises of Primary Quarantine Unit, Amkunj, Middle Andaman, Secondary Quarantine Unit and Nucleus Breeding Centre, Kodiyaghat, South Andamans. The operational activities of each of the project units recorded for the current review period is furnished below:

Primary Quarantine Unit, Amkunj, Middle Andamans:-

The primary quarantine unit produced thirty-seven new founder families of tiger shrimp (*P. monodon*) from gravid females, during the period under review. Among these, seventeen were ensured free from the pathogens listed in OIE (Officio International Epizootiics) and USMFP (united States Marine Shrimp Farming Programme) and qualified to be selected for breeding purpose. Most of the founder families were produced from wild caught gravid females and broodstock collected from Betapur.



P.monodon stock selected for breeding (The selected shrimps were tested free of OIE and USMFP listed pathogens)

Secondary Quarantine Unit:-

The founder families were transferred to Secondary Quarantine Unit for continuous screening of OIE and USFMP pathogens. Those families which qualify the criteria for selection were transferred to Nucleus Breeding Centre to produce successive families.

Nucleus Breeding Centre:-

Two G2 families, Six G3 families, One G4 family and Twenty three G6 families were produced during the period of report. Periodic disease surveillance has been carried out for the shrimp families in DTSP

NBC as per the Standard Operating Procedure. The shrimp samples were tested at RGCA- Central Aquaculture Pathology Laboratory (CAPL), Sirkali and Aquaculture Pathology Laboratory (APL), University of Arizona. Test reports from both the laboratories indicated that the stocks were free from the OIE listed and USMFP listed shrimp pathogens.

In house bio- secure shrimp feed preparation unit:-

The in house feed preparation is equipped with machineries such as kneader, meat mincer,

steamer, hot air dryers and deep freezers. The capacity of the feed unit is 7 kg per day. The trash fish required for feed preparation such as anchovies, tuna fish and squid were sourced locally in Andaman Islands where as other ingredients such as vitamins, minerals, soya floor etc were sourced from the mainland. The feed unit had produced and supplied 998 kg of high quality grow out feed /specialised maturation feed for NBC, SQU and PQU operations.

Shrimp Breeding Nucleus Production Centre, at OSSPARC

The current period recorded the production of twenty seven families of fifth generation of *P. monodon* from the SBNPC facility at OSSPARC, Gopalpur, Orissa. The shrimps attained matured stage and successfully spawned. The sixth generation families were obtained, which comprised of twenty five numbers.

SPF tiger shrimp brooders produced by this facility was also provided to be displayed for the 20th International Seafood show.



An SPF P. Monodon Brooder



NBC Nursery Tanks



Scampi Broodstock Development Project

Project Location : Hatchery facility at Kankipadu and Experimental Farm at Manikonda, Krishna District, Andhra Pradesh

Year of Commencement : 2007

Scope of the project

Identification of best Indian strains of Scampi (*Macrobrachium rosenbergii*) for selective breeding programme in order to produce and supply disease free (White Tail Disease) and high performing Scampi stocks to hatcheries across the country, is the prime focus of the Scampi Broodstock Development Project. In addition to this, the project conducts commercially oriented research for the production of all-male scampi seeds through the development of "Neofemales".

The project also envisages to develop technologies for All-male Scampi seed production through "Neofemales" and sex determination by molecular sex marker methods.

Description of the facility

The facility comprise of a hatchery unit at Kankipadu, village and an experimental farm of 17 acres, at Manikonda, Krishna district. Separate sections for conducting microsurgery breeding and maintenance of neofemales, are present in the facility.

Activities & Accomplishments

Microsurgery of Scampi Post Larvae for the development of Neofemale is carried out by early identification of Scampi males at the PL stage of 15- 25. The males were then subjected to

microsurgery for the ablation and removal of Androgenic gland. During the current review period, 5,149 nos of male scampi PL were identified and ablated from a lot belonging to Kerala strain, that comprised of 76968 nos. Similarly, from the West Bengal strain 25,975 nos of Post Larvae were segregated and 3,411 nos of identified males were ablated. The larvae were assessed for the sex reversal.

Production of Neo females

A total of sixty five Neofemales (females that yield all male progeny) which included 60 from Kerala strain and 5 from West Bengal Strain were produced during the period under report. By the end of March 2016, the facility maintained a total of 99 nos. of neofemales comprising of 92 nos. of Kerala strain and 7 West Bengal strain. About 10 batches of larval cycles from these Neofemales were being maintained in the hatchery for their reconfirmation as Neofemales.

Promotional Seed Supply

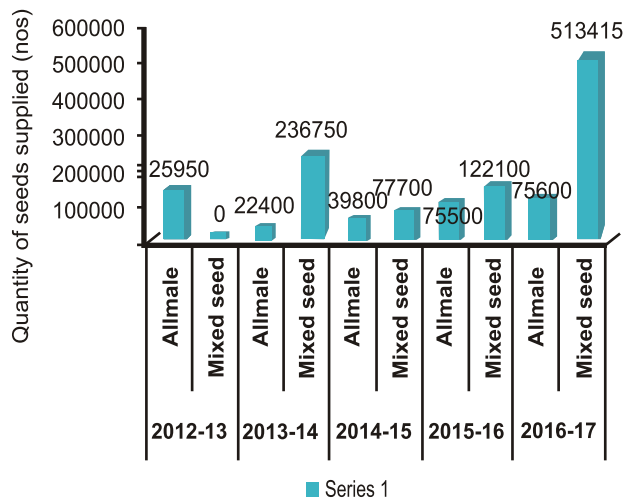
The current review period recorded production of 5,89,015 Scampi seeds including 75,600 nos. of all-male seeds that were supplied to 6 farmers in Andhra Pradesh. Parameters such as growth, yield and profitability of mixed seed farming were evaluated and compared with the data obtained from all male seed farming of Scampi.



Sampling of scampi

Supply of selectively bred Scampi brooders

Selectively bred male and female scampi brooders along with berried stocks were supplied to the commercial hatcheries. The project supplied a total of 4926 nos of selectively bred third generation brooders to four private Scampi hatcheries in Andhra Pradesh & Kerala. Excellent feedback was received from the stake holders in terms of fecundity, fertility, hatching and stage conversions.



Year wise supply of mixed and all male scampi seeds



Scampi Post larvae



Supply of Broodstock to the commercial hatchery



Artemia Project

Project Location : Tharuvaikulam, Tuticorin, Tamil Nadu
Uppoor, Ramanathapuram, Tamil Nadu

Year of Commencement : 2007

Scope of the Project

The project focuses on the technology development of indigenous production of Artemia cyst and biomass by utilizing locally available saline salt pan areas. The developed technology would be disseminated to Self-Help Groups, entrepreneurs and salt producing companies.

Description of the facility

The Artemia Farm at Tuticorin extends over an area of 6.75 Ha comprising of designated ponds for culture of artemia as well as microalgae. Eight ponds are HDPE lined and remaining, earthen type. A system of evaporation ponds is also present in the farm. The facility also contains a microalgal culture laboratory for maintenance of Algal strains and a quality evaluation lab for assessing the quality of Artemia Cyst and Biomass produced by the farm. A separate processing and packing section for processing and storing of artemia Cyst and Biomass is also present. The entire farming area is bird fenced to prevent the entry of birds, which are the prime vectors for many pathogens.

Activities & Accomplishments

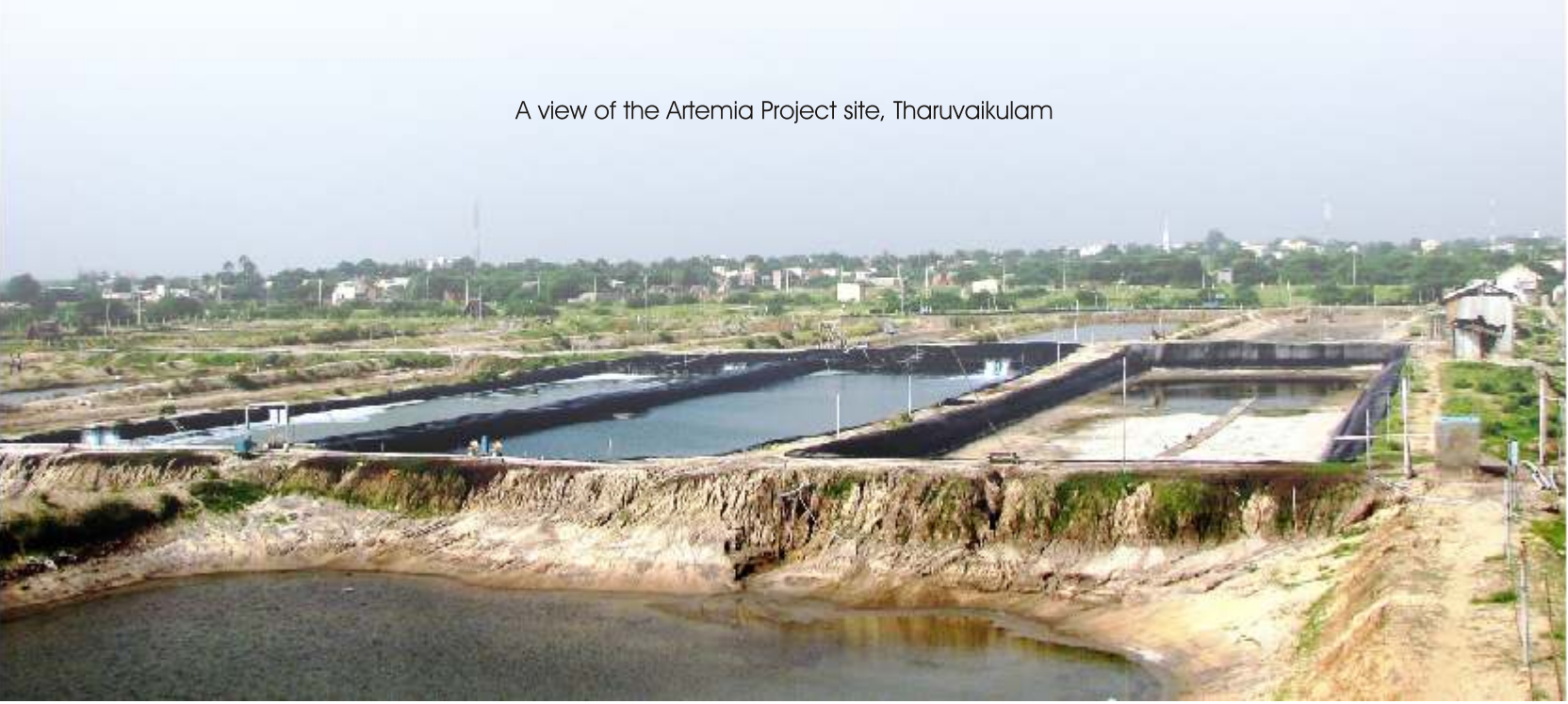
Production of Artemia Cysts

The current review period recorded production of 594.635 kg wet cysts collected from the farm facility at Tharuvaikulam, Tuticorin. The quantity of dry cysts produced obtained from 614.525 kg of wet cysts was 157.528 kg. The cysts were assessed of its quality and packed in nitrogen flushed containers. The project supplied a total of 153 kg (360 tins) artemia cysts to Ornamental Fish breeding units, Shrimp and other finfish hatcheries. About 127.960 kg wet cysts were kept in drum for diapause induction to maximize hatching yield of the cysts.

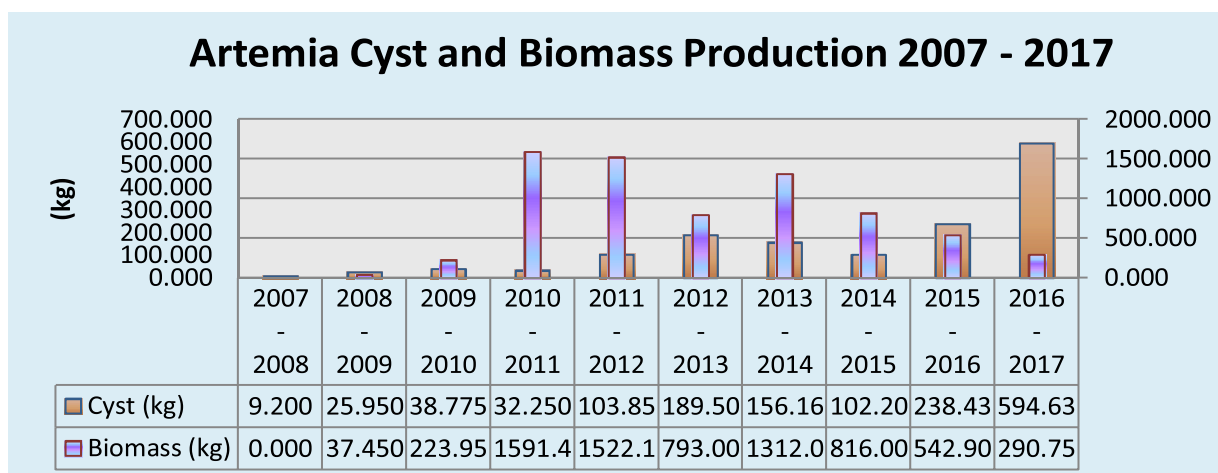
Production of Artemia Biomass

About 142.6 kg of frozen artemia biomass which was the remaining stock from the previous year harvest was made available for supply during the period under report. In addition, 297.750 kg of Artemia Biomass was harvested in the current review period. From which 437.00 kg of frozen Artemia Biomass was supplied to the shrimp hatcheries, ornamental fish breeding units and research organizations. The remaining stock of 3.350 kg was kept in deep freezer for future supplies.

A view of the Artemia Project site, Tharuvaikulam



Artemia Cyst and Biomass Production 2007 - 2017



Artemia cyst production trends in R&D trials (2007-2017)

Artemia Demo farm, Uppoor in Ramanathapuram Dist.

Year of Commencement : 2016

Scope of the Project

RGCA has standardized cyst production technology and produced 1440kg wet cysts through its various production trials. The optimum targeted unit production of 150kg/ ha/ crop (90days) was achieved by multi-crop culture. The cyst produced from RGCA's units has good hatching rate of 90-95%. Through the production trials conducted, about 7.120 tons of quality Artemia biomass was harvested and supplied to various hatcheries in frozen form.

Based on the results obtained from the various production trials, RGCA embarked on an Artemia demonstration farming programme for the benefit of Self Help Groups and fisher community, for which a demo farm was established at Uppoor, Ramanathapuram District. The project provides hands-on training to the SHGs and interested entrepreneurs paving way for the large scale production of Artemia cysts required for the country's aquaculture sector. The prime focus of the training is to empower the Socio-economic status of coastal community women group through Artemia cyst and biomass production. So far, a total of 40 participants were retrained. The SHG members who had acquired training are now being engaged for the operation of Artemia Demo farm at Uppoor.

Description of the facility

The Demo farm at Uppoor extends over an area of 10 Ha and comprise of 36 nos of Artemia

production ponds and 8 nos. of algal culture ponds. Among these, the algal culture ponds are HDPE lined whereas the artemia culture ponds are earthen ponds. The facility is also equipped with a Microalgae stock culture laboratory and indoor scale-up unit for maintenance of Algal strains. The entire farming area is covered by bird fencing to avoid bird's predation as well as the contaminations of pathogens into the farm through birds.

Activities & Accomplishments

Production of Artemia Cysts

Trial culture on artemia commenced on the farm at Uppoor on September 2016. The yield obtained was 196.360 kg wet cysts, which was subsequently processed to produce 35.420kg of dry cysts. These were packed in vacuum tight nitrogen flushed containers. About 84 nos. of artemia cans were made ready during the review period, from which 74 were supplied to Ornamental Fish breeding units, Shrimp and other finfish hatcheries after quality evaluation.

Production of Artemia Biomass

The farm harvested 45.200 kg of artemia biomass and supplied 44kg to the shrimp hatcheries, ornamental fish breeding units and research organizations. The remaining stock of 1.2kg was kept in deep freezer for future supplies.



A view of Artemia demo-farm, Uppoor, Ramanathapuram



A view of Artemia demo-farm, Uppoor, Ramanathapuram Preparation of supplementary feeds for Artemia at Artemia Demofarm, Uppoor



Observation of Water Quality Parameters by SHG members Application of fertilizers in algal ponds by SHG members at Artemia Demofarm, Uppoorat Artemia Demofarm, Uppoor



Broodstock Multiplication Centre for *L. vannamei*

Project Location : Mangamaripeta, Bhimilipatanm,
Viskhapatnam, Andhra Pradesh

Year of Commencement : 2011

Scope of the Project

The project was established with the aim to produce and supply SPF *P. vannamei* brooders to the vannamei hatcheries of the country, so that the sector could minimize the importation of vannamei brooders to India, which is otherwise an additional financial burden to the importers (vannamei hatchery operators). The installed capacity of the BMC was 45,000 broodstock per annum, which has been later enhanced to 60,000 broodstock per annum.

Description of the facility

The facility has two major shrimp rearing components, viz., Phase I and II.

Phase I houses shrimp larvae at PL-15 stage and rears to 15gm size. This system has twenty tanks of different capacities to accommodate different sizes of shrimps as the shrimp grows. The Phase II rearing system consists of 16 tanks to stock and rear 15gm shrimps to brooders. In addition to this, the facility has micro algal mass scale culture units and other supporting systems.

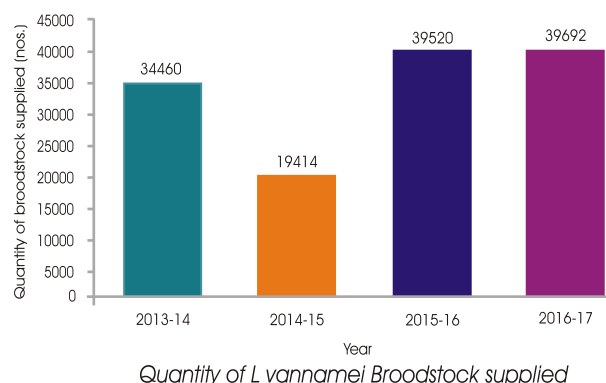
Activities & Accomplishments

The facility receives SPF germplasm from the Oceanic Institute, Hawaii, quarantines for a period of 15 days at the Centralized quarantine unit (AQF) and rears to broodstock at the BMC, Vizag. The shrimps are fed with commercially available formulated bio-secure and semi-moist feeds throughout the rearing period, which normally range from 6-8 months. The water quality is maintained with the help of recirculation unit provided at each sections separately. Algal bloom predominant with *Chaetoceros* spp is also maintained in the rearing tanks so as to maintain good water quality and condition the rearing water.

During the rearing period, the shrimps are screened to ensure the SPF status. Samples were drawn at different growth stage of the shrimps and detected for the presence of major pathogens such as WSSV, TSV, YHV, IHHNV, IMNV, MBV, BP, HPV, MoV, AHPND/EMS, EHP and NHPB through PCR, RT-PCR and histology. The screening is conducted at three stages, i.e at 1-2 g; 15-20 g; and 35-40 g. Histopathological tests are also conducted at least once or twice in a year.

Production and supply of *L. vannamei* broodstock

During the period under report, a total of four consignments of SPF *P. Vannamei* Post Larvae consisting of 61,097 PL were imported for the production of quality SPF *L. vannamei* broodstock. The facility produced and supplied 35,692 numbers vannamei brooders to the approved vannamei hatcheries in 48 batches. The quantity of brooders supplied during each month during the current review period is shown in the graph below



Evaluation Studies

Prior to importation of the cohort (batch) for the broodstock rearing, an evaluation study in actual farm conditions in Indian grow-out systems, was conducted with different cohorts obtained from M/s Oceanic Institute, Hawaii, USA. This is done to evaluate the growth performance in Indian Farming conditions. The evaluation studies are being carried out under the supervision of

scientific teams of Oceanic Institute, P. vannamei BMC and the Central Aquaculture Genetics Lab of RGCA. During the period under report, four such evaluation studies were conducted and baseline data on growth and survival were collected. The data obtained was then analysed for selection of the best families suited to be cultured in Indian Farming conditions.



A view of the P. vannamei Broodstock Holding Facility of RGCA



Tilapia Project

Project Location : Manikonda, Krishna District, Andhra Pradesh

Year of Commencement : 2008

Scope of the project

This project is focussed to propagate the importance of species diversified aquaculture and also to develop and disseminate technologies on breeding, all male seed production and grow out farming of tilapia. The Project facility consists of a Genetic Nucleus Breeding Centre of GIFT strain (one of the most successful and popular strains of Tilapia for Aquaculture in the world) established in technical collaboration with World Fish, Malaysia. The project runs a fully pedigreed selective breeding programme that can support emerging Satellite Breeding Centres and Hatcheries across the country through supply of selectively bred high quality germplasm. In addition to the supply of broodstock and all male seeds of tilapia, the project also imparts training and offer consultancy services for Tilapia aquaculture.

Description of the Facility

Major components of the facility are a 12.7 acre farm, comprising of 20 ponds (10 each of 300 sqm water spread area and 2600 sqm WSA respectively), with a reservoir for water storage and conditioning and an effluent treatment pond where water is held for sedimentation before discharge. In addition to these, the farm has a breeding unit housed with incubation jars and a separate all-male seed production unit comprising of 14 nos. of 2 MT tanks.

Selective breeding programme of GIFT strain.

The fifth generation animals which were under nursery rearing in 1X1X1m 20p hapa were grown to tagging size during the review period. A total of 6074 nos animals representing 73 families from seventh generation and 12 nos of families from the second and third generations under genetic gain experiments were tagged.

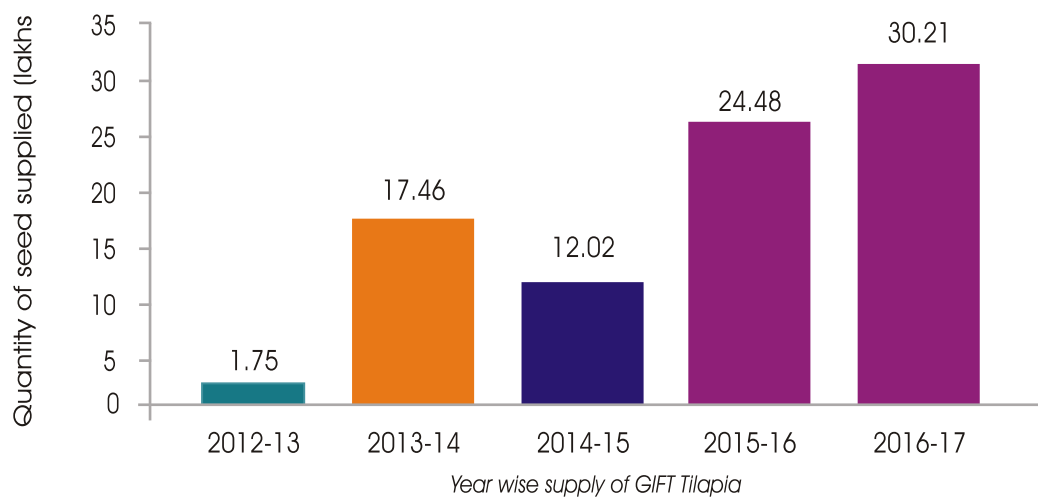
Fresh batch of forty families of 1375 nos. of GIFT tilapia were imported. Among this, 35 nos. were lost during quarantine and the remaining 1340 nos. of fish were grown to tagging size and tagged. For communal rearing about 7414 nos of fry representing 132 families were tagged and selected. The identified fish were stocked in two ponds of 2600 m² in duplicates with an average stocking density of 1.42 fish/m². The fish (5454 nos) were harvested on attainment of broodstock size and stocked in 48 nos of 3X3X1m conditional hapas at a rate of 120 fish per hapa. Morphometric data of the harvested individual fish were recorded along with the tag id and the data was submitted to the World Fish Centre for preparation of the mating list. Accordingly 532 nos of fish consisting of 266 nos each of males and females were selected for mating for the production of the sixth generation stock. A total of 7 nos of egg collections were performed and 158 nos of successful spawn in the sixth generation were collected from the mating hapa.

Nursery rearing

Nursery rearing of the GIFT was conducted in hapas of size 1X1X1m with 20p mesh size, deployed in open pond system. Fish selected from 158 families belonging to the sixth generation were stocked in these hapas and reared.

Production and supply of all male tilapia seeds

The project accomplished production of 8.1 million tilapia fry from a quantity of 27 million eggs with a hatching rate of 29.8%, during the current review period. Of these, 3.02 million all male tilapia seeds were supplied to the farmers and government fisheries departments of different states. Year wise seed supplied is as shown in the figure below.



Technology Transfer to Tamil Nadu State Fisheries at Krishnagiri

Technology transfer is one of the key mandates of RGCA and hence as a part of its implementation, the project supplied GIFT broodstock to Krishnagiri Tilapia Breeding Centre located at Tamil Nadu, for establishing GIFT Tilapia Breeding centre at Krishnagiri. A total of 4 cohorts labelled as A,B,C and D representing 150 each of the 600 nos GIFT broodstock were provided to the Breeding centre under the Technology transfer programme. The cohort animals were segregated sex wise and mouth clipping was performed for the male fish. The fish were then stocked in hapas and conditioned. About 5% of the male and female fish were selected and stocked for mating in 3X3X1m 20P mash hapa, as per the rotational mating

programme. The remaining fish from the cohorts were stocked in mating hapas (10X3X1M-20 P mesh) for production of all male seeds.

The project also sensitized the technical staff of the Tilapia Breeding Centre at Krishnagiri on different aspects of tilapia breeding such as preparation of incubation jars, setting up of fry collection hapas, Biofilter maintenance, egg collection procedure, egg cleaning, Disinfection of egg, estimation of egg, stocking procedures, Hormone feed preparation, etc. A breeding unit with 12 nos of 20 litre capacity was installed at the site with re-circulatory system and biofilters for water treatment. The Department with technical expertise from RGCA produced and supplied 1 million all male seeds to the industry.

Packing of GIFT Tilapia all male seeds



Supply of Germ plasm to the University of Agricultural Sciences Bengaluru.

The project facility has successfully produced and supplied 48 nos of GIFT Broodstock grouped into 4 cohorts each with 12 nos of brood stock and fingerlings on 2nd October 2016 to the University of Agricultural sciences Bangalore. A maiden hatchery was set up by KAU at Inland Fisheries Unit, Hebbal for the conducting Rotational mating programme with GIFT cohort and also production of all male GIFT seeds at their facility. On 3rd October 2016 inaugural stocking of GIFT Cohorts was conducted by Dr B.V. Krishnamurthy, Professor of Fisheries Dr K.V.Devaraj Former VC of UASB, Dr Gangadharappa, Director of Research, USAB, Dr Seenappa Chief Scientific Officer and P.Srinivasa Rao APM. The project has assisted in transportation of Broodstock fingerlings from Manikonda farm to USAB and stocking of Cohorts at USAB farm facility.



Tagging of tilapia

Consultancy

The project facility imparts consultancy to the Tamil Nadu state fisheries Department on all male Tilapia seed production and also had signed an MOU for the establishment of GIFT Tilapia Satellite Breeding Centre with Andhra Pradesh state. The site selection and detailed project Report has been finalized and the site at Ananthapur District was found suitable.



Packing of all male tilapia seeds



Marine Finfish Hatchery Project

Scope of the Project

The project envisages to develop hatchery technology for seed production of highly valued export oriented marine finfish species such as cobia (*Rachycentron canadum*) and Pompano, (*Trachinotus blochii*). A sea cage farm facility at Muttom, and an open sea cage demonstration farm at Adimalathurai districts in the Kerala state has been established respectively, for brood stock maintenance and technology demonstration programme for Cobia farming.

Activities and Accomplishments

Broodstock collection & Quarantine

Cobia brooders of size range 6.6 to 23 kg body weight and sub-adults of the size range 3-6 kg were selected from the sea cage demonstration farm of Marine Finfish Hatchery Project, Muttom. The fish were transported to the hatchery at Pozhiyoor for breeding programme and brood stock development and were quarantined under

strict quarantine protocols. The brooders and sub-adults were then maintained in RAS for further conditioning and maturation process.

For the purpose of broodstock development, fish of adult and sub-adult stages were utilized, in addition to the wild caught ones. About 5 adult broodstock, 53 sub adults and 3 wild caught sub adult cobia were maintained in Sea cage farm, during the current period.

In addition to these, about thirty nos. of cage reared live cobia juvenile fish with an average body weight of 2.35 kg was procured from a fish farmer from Mandapam, Tamil Nadu. These fish were transported to sea cage farm of RGCA at Muttom and stocked in 5m x 5m HDPE square cages for brood stock development. Liquid oxygen cylinders were used during transport. Out of these 14 fish were being maintained in cages at survival rate of 46%.



Stocking of Sea Cage farm with Cobia and Pompano juveniles

Spawning and larval rearing of cobia

The review period recorded two captive spawnings of cobia. About 7.89 lakhs eggs were obtained in the two successive spawnings, out of which 2.16 lakh of fertilized eggs were directly stocked in larval rearing tanks. About 17,662 fingerlings of size range 6.5 to 8 cm length were obtained from one batch.

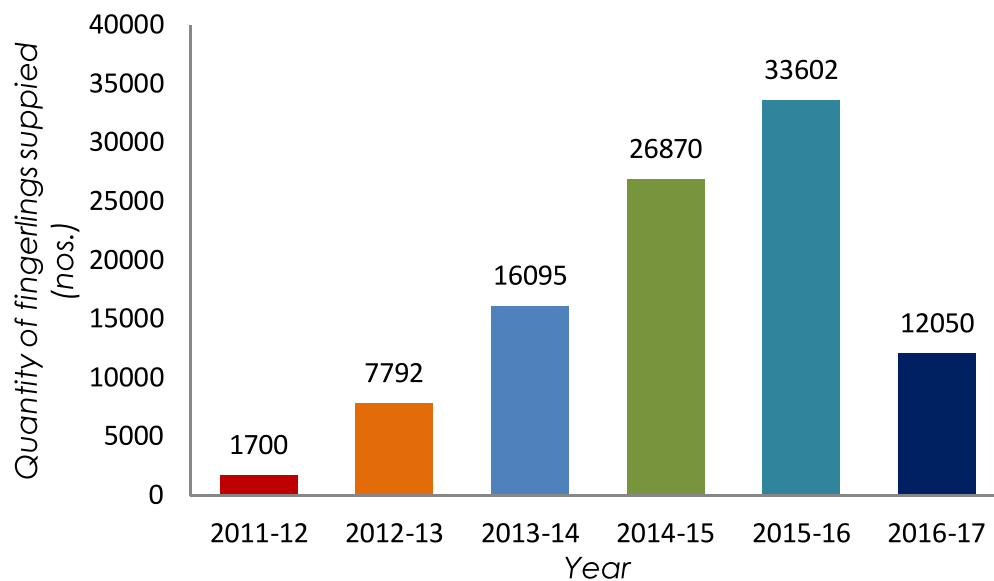


Cobia Fingerlings reared in RGCA Marine finfish hatchery

Supply of Cobia seeds

The facility supplied a total of 12050 Cobia fingerlings and juveniles to the Department of Fisheries, A.P. National Institute of Ocean Technology, Chennai, CMFRI, Karwar, and Fisheries Department Tamil Nadu for their Sea cage culture demonstrations and for display in India

International Sea food Show 2016 held at Vizag, AP. Live Cobia Juvenile fishes of size range of 1.6 2.6 kg harvested from Sea cage farm of RGCA were also supplied to CMFRI Mandapam, Ramanathapuram during the current review period.



Year wise production of Cobia seeds



Live fish transport using Liquid oxygen cylinder
Live fish transport using Liquid oxygen cylinder

Production of rotifer (*Brachionus plicatilis*)

The live feed unit of the project produced continuous culture of rotifers which served to sustain the production of Cobia and Pompano Seeds.

Grow-out rearing of cobia juveniles in sea cage farms:

Cobia juveniles of 5,111 nos. of size range 23.8 - 28.9cm (total length) and body weight 78 - 152 gm were stocked in cages deployed in sea cage farm of RGCA at Muttom for grow out farming.

Production of Sea Farmed Cobia

The current review period recorded harvest of 874 and 1454 kg of kg of cobia fish from the sea cage demonstration farm at Muttom and from open sea cage farm at Adimalathurai respectively.

Captive reared Cobia in European Seafood Expo

Captive reared cobia of 54.3 kg, from the project were also airlifted and displayed in European Seafood Expo Global International trade fair 2016, organised at Brussels on 10th and 12th April 2016.

Broodstock Development of Pompano and Red Snapper

Sub adult pompano (92 nos) and *Lutjanus* sp (21 nos) were maintained in two separate HDPE cages for broodstock development at the RGCA sea cage farm.

Four successful breedings were obtained in Pompano during the period under review that produced around 48.02 lakhs eggs. Out of these 30.49 lakh of fertilized eggs were directly stocked in larval rearing tanks. The facility produced about 23,951 fingerlings of size range of 1.2-3cms total length from the six batches of pompano. The current review period recorded a supply of 22,597 Pompano fingerlings to various beneficiaries comprising of farmers, research organizations such as CMFRI, Fishery Universities, Regional Centres of MPEDA, Aquaculture Demonstration Farms of RGCA, Government of Goa, Central Island Agricultural Research Institute, A & N island, Agency for Department of Aquaculture (ADAK), and Fish Farmers Development Agency (FFDA) in Kerala for their culture demonstrations.

Infrastructure additions:

The facility completed power Up-gradation and hatchery renovation works during the period under review.



Grouper Project

Project Location : Sea Cage Farm at Rutland Island,
South Andaman

Year of Commencement : 2006

Scope of the Project

Grouper, are one among the much sought after marine finfish species in the consumer market. The fish is abundant in Andaman waters, and provides ample scope to be utilized as a potential species for culture. RGCA embarked on this project in the year 2006, to develop technology for breeding and farming of the fish and to produce and supply grouper seeds to all over India including Andaman & Nicobar Islands.

Present status of the Project:

Two acres of land area was allotted by the Andaman & Nicobar Administration to construct a state of- the- art multispecies grouper hatchery at Rangachang Village, South Andaman. The clearance of the land need to be obtained from National Coastal Regulation Zone Management Authority, New Delhi

Description of the Sea cage facility:

The sea cage facility comprises of 21 HDPE cage rafts of 3m x 3m dimension moored along with three floating wooden platforms of 5mtr x 5mtr dimension such as one for watchman shed and two working platforms for fish grading, prophylactic treatment and to keep net cages and its accessories. The HDPE cage rafts are being used to hold and condition wild caught grouper broodstock such as Tiger grouper, Mouse grouper, Squaretail coral grouper and Orange spotted groupers. This facility also holds F1 generation grouper broodstock for the breeding programme. In order to transport cage materials and for commutation of the personnels, an FRP speed boat propelled with 40 HP out board motor is also in place. The boat has been registered with Department of Fisheries, A & N Administration.

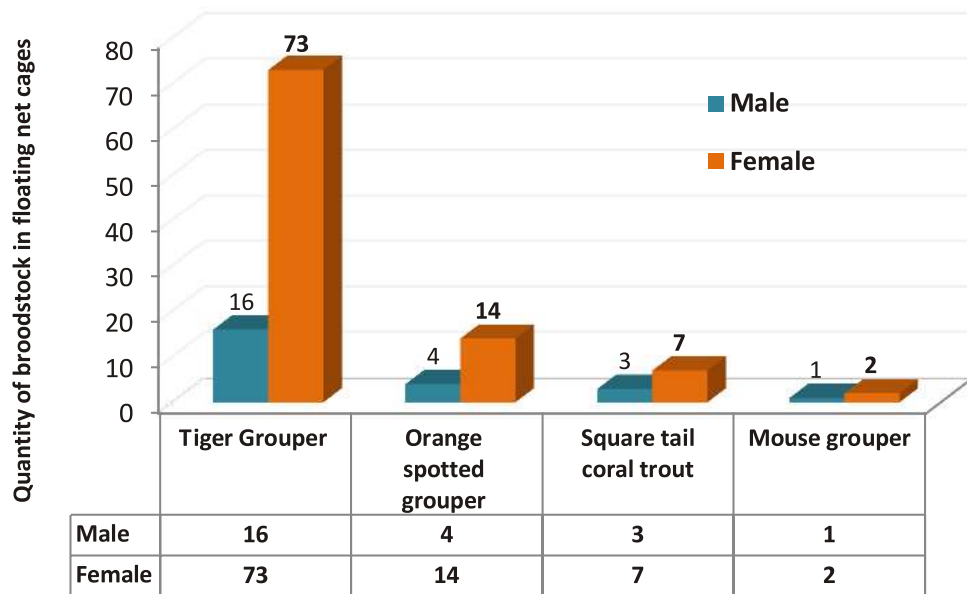


Grading of tiger grouper

Broodstock maintenance in open sea cage facility

In the current review period, the wild caught and first generation grouper broodstock were maintained in floating net cages. All the broodstock were tagged with Radio Frequency Information Device (RFID) tags to monitor the spawning performance of individual brooders. Natural spawning was observed regularly for the Tiger grouper except in the month of April and May due to the high

temperature. The brooders were fed with nutritionally balanced frozen fish mainly mackerel and sardine on alternate days. Squid was fed once in a week to improve gonad development. Fresh water bath treatment was done once in a month to reduce the attachment of external parasites and epibionts. The broodstock holding net cages were changed once in a month to prevent clogging and to permit free flow of water.



Quantity of Broodstock maintained in floating net cages





Aquatic Quarantine Facility for *L. vannamei* (AQF)

Project Location : Neelankarai, Chennai, Tamil Nadu

Year of Commencement : 2009

Scope of the Project

The Aquatic Quarantine Facility for *L. vannamei* is a state-of-the-art quarantine facility of RGCA-MPEDA designated to facilitate quarantine services to the exotic shrimp *Penaeus vannamei* imported to India. The facility was established in 2009 by RGCA-MPEDA under the Animal Quarantine & Certification Services, Dept. Animal Husbandry Dairying & Fisheries, Ministry of Agriculture & Farmers Welfare. The AQF ensures the Specific Pathogen Free Status (SPF) of the stock that are imported and thus nullifies the risk involved in the introduction of this exotic species into the Country.

Activities and Accomplishments:

During the period under review, the facility scaled up its quarantine carrying capacity in line with the increased number of *P. vannamei* hatcheries. All the twenty quarantine cubicles of the facility were infrastructurally upgraded to accommodate maximum biomass of 25 Kg. of brooders. This option was opened up for the hatcheries on June 1, 2016. Similarly AQF also implemented major

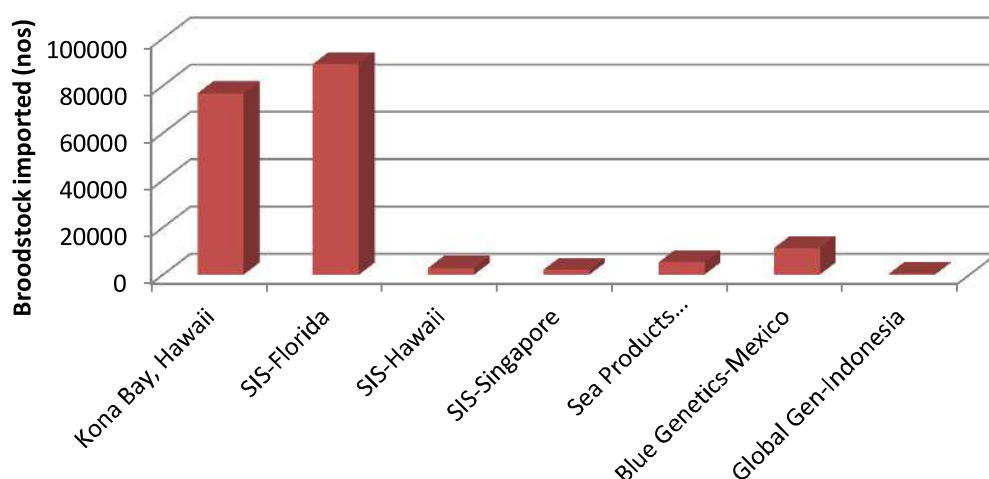
changes in its online quarantine space reservation system in line with the changes with the change in formats and validity period of the essential documents issued to the hatcheries by the Ministry of Agriculture for broodstock import.

During the review period, the PCR lab of AQF also included an additional pathogen, the AHPND-Acute Hepatopancreatic Necrotic syndrome which was listed in the OIE on 2016, in the disease screening list with effect from 24th July 2016. Thus, the AQF currently assures the SPF status of the imported stock for seven OIE listed pathogens.

The total number of broodstock quarantined by the facility was 204726 numbers received in 284 batches. The total broodstock despatched was 187596 nos., comprising of 94102 male and 93494 female broodstock. The stock were supplied from 7 different broodstock centres, viz; M/s. Shrimp Improvement Systems (SIS), Florida, M/s. SIS, Hawaii, M/s. SIS, Singapore, M/s. Kona Bay Marine Resources, USA, M/s. Sea Products-GBT, Texas, M/s. Blue Genetics, Mexico and M/s. Global Gen, Indonesia.

*A view of broodstock Quarantine cubicles for *P.vannameli* at AQF, Chennai*





Supplier-wise import of P. vannamei brooders to India during 2016-17

Of the 657 quarantine cycles available for the year 2016-17, (inclusive of the 7 additional quarantine cycles opened up during the period of December 2016), only 450 cycles was utilized. Thus the percentage of cubicle occupancy recorded was 68.49%. The quarantine survival achieved during the period under review was 94.87%.

Samples collected at random from each of the 284 imported consignments revealed that the tested samples were free of the tested pathogens.

Quarantine of *P. vannamei* postlarvae

Five batches of *P. vannamei* parent postlarvae (PPL) comprising of total of 61097 nos. were imported by M/s. RGCA from the Oceanic Institute, Hawaii, USA. The total stock received in live condition was 49201 nos. Out of the five batches, the first two batches (received during April & May 2016) were quarantined for a period of 5 days and the remaining three (received since August 2016) were quarantined for a period of fifteen days as per

the order issued by the Ministry of Agriculture. The quarantine survival achieved for the larval batches in terms of live received was recorded as 94.74 %. The disease screening test of the larval samples collected at random from each of the five batches revealed that the tested samples were free of the OIE listed pathogens and hence the batches received were SPF.

Upgradation of the facility:

During the period under review, the facility was upgraded by additional supporting systems to quarantine high biomass of imported *P. vannamei* brooders. The systems included 2 additional chillers (10 TR & 15 TR), 32 nos. of oxygen concentrators, glass bead filters and 9 set of ozonisers. Similarly, the disease screening laboratory of AQF was also renovated. The lab was upgraded further with 2 more cooling centrifuges and high throughput thermal cyclers to handle more samples and pathogens.



A consignment being received in Prequarantine area



Technology Transfer Training & Administrative Complex





Technology Transfer Training Division

The culture technologies standardised and developed by the organisation is disseminated through a dedicated wing of the centre, called the Technology Transfer Training and Administrative Complex (TTTAC). This unit conducts a host of training and outreach programmes on various culture techniques and best management practices for the benefit of aqua culturists, academe, entrepreneurs, scientists and farmers. The TTTAC plays a key role in contributing to the economic and social benefits of the stakeholders. It functions from the the Head Quarters of the

institute located at Karaimedu Village, Sirkali, Nagapattinam district.

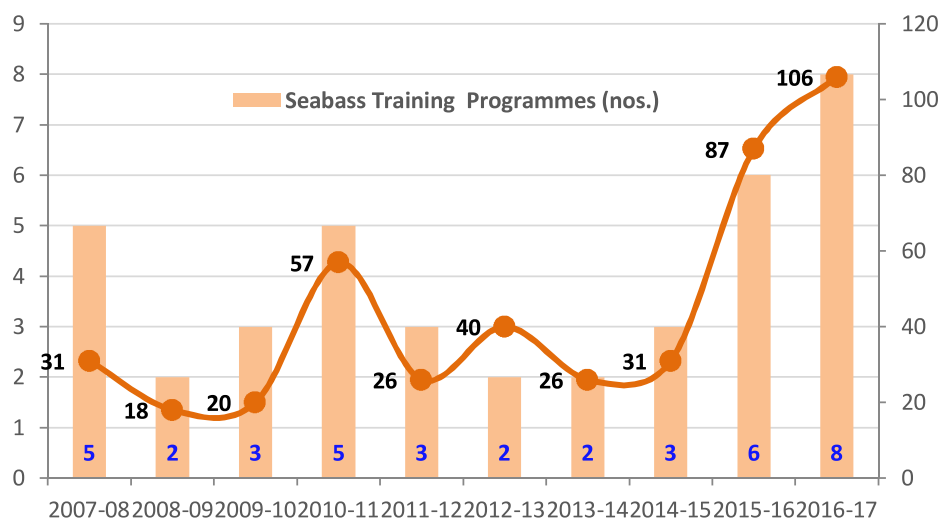
Besides, serving as a channel for technology transfer, the TTTAC also collects detailed feedback on seed/broodstock performance supplied by the relevant projects, for further improvement of the products provided by the institute. Feedback on the quality of the training programme conducted by the institute is also collected and analysed by TTTAC.

Training Programmes

Best Husbandry practices in Asian Seabass culture:

TTTAC recorded eight training programmes on Asian seabass culture in which hundred and six beneficiaries participated. Two training programmes on seabass culture were organized exclusively for the benefit of Fishery officers from the

Dept. of Fisheries, Kerala and MPEDA and six other training programmes for the benefit of farmers, entrepreneurs, technicians, consultants and students from various parts of the country. A total of 108 participants were benefitted from these programmes. On completion of the programme 28 trainees procured Seabass fry from the RGCA hatchery for trial farming.



Training programmes conducted on Seabass aquaculture



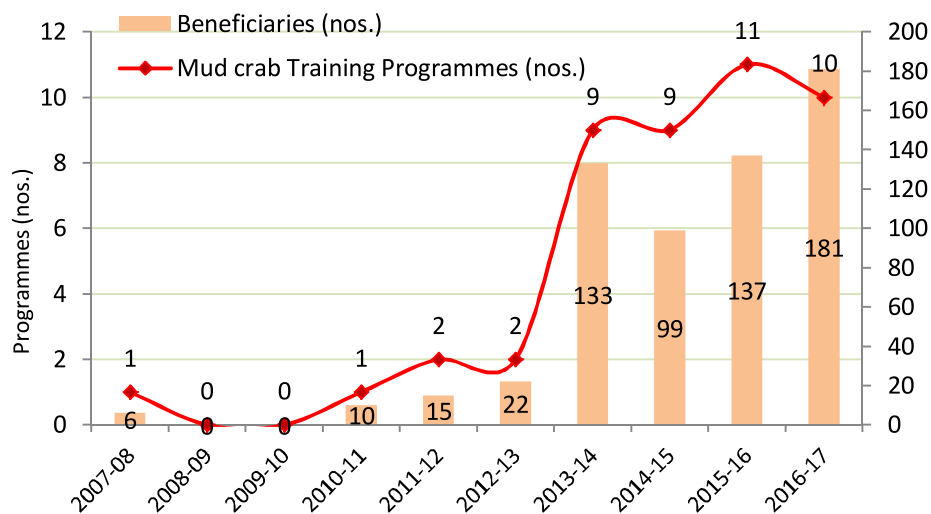
Trainees actively involved in Cage fabrication, net tying & Feeding of seabass fingerlings at RGCA Aquaculture Demonstration Farm, Karaikal.

Mangrove Crab Aquaculture

Ten training programmes were conducted on Mangrove crab aquaculture during the period under review. Out of these, six programmes were exclusively conducted for the benefit of farmers, entrepreneurs, technicians, consultants, fisherfolk and students from various parts of the country. A

total of hundred fifty seven participants benefitted from these programmes.

Exclusive training programmes on mud crab culture, for the benefit of officials from the MPEDA, and TERI, Goa were also organized in which 24 officials from various parts of the country participated.



Training programmes conducted on Mangrove crab aquaculture



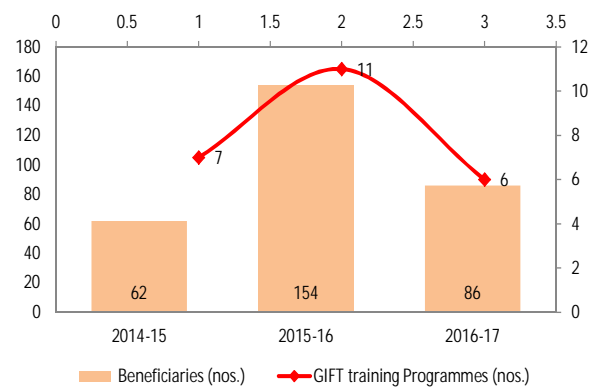
Crablets being harvested and graded by the trainees



A trainees involved in Tilapia upper jaw surgery and egg collection



An on site theory class on haps in progress



Training Programmes conducted on GIFT breeding and seed production

Breeding, seed production and Grow-out farming of GIFT

During the period under report, six training programmes were conducted on Genetically Improved Farmed Tilapia (GIFT) out of which two programmes were exclusively for MPEDA officials from different centres of the country. Four training programmes for the benefit of 65 participants were also conducted

Live feed production for Marine Hatchery operation

Student oriented training programmes on live feed production was conducted by TTAC, during the period under report. The sessions included culture techniques of different kinds of phytoplankton (unicellular diatoms such as Chaetoceros, Chlorella, Nannochloropsis and Tetraselmis) and zooplankton such as Rotifer varieties Brachionus plicatilis and Brachionus rotundiformis, copepods, and Artemia).



Officials and Students involved in a practical session on live feed production training programme

Application of Molecular markers in Fisheries and Aquaculture

A training programme on Application of Molecular markers in Fisheries and Aquaculture was conducted for Students, Research Scholars, Academicians & Aquaculture stakeholder from Andhra Pradesh, Goa, Karnataka, Kerala & Tamil Nadu. The sessions included for the training programme were molecular identification of species, strain and hybrid genetic diversity and resource analysis of aquaculture stocks, assessment of the impact on natural populations by escaped/released cultured fish, comparisons between hatchery and wild stocks, monitoring of inbreeding or other changes in the genetic composition of the stocks, assignment of progeny to parents through genetic tags, assessment of successful implementation of genetic manipulations such as polyploidy induction and gynogenesis.



Trainees involved in the GIFT tilapia tagging and practical session at RGCA, HQ

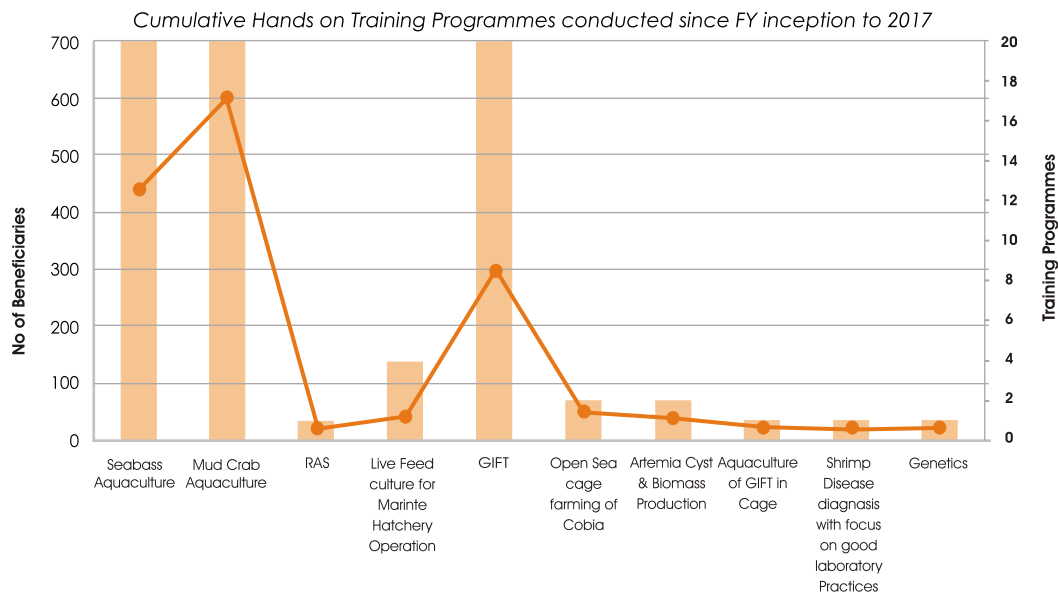
Awareness programme cum workshop

RGCA organised a one day awareness programme cum workshop for the benefit of farmers on "Shrimp Diseases and its Preventive Measures" on 24th March 2017 at Technology Transfer Training and Administrative Complex, RGCA HQ Sirkali. The programme was inaugurated by Dr.S. Kandan, Project Director RGCA and Shri. Reji Mathew, Assistant Director MPEDA, Nagapattinam. Dr.S.Anand Assistant Professor, Department of Aquatic Environment Management, Tamil Nadu Fisheries University, Nagapattinam, Tamil Nadu was invited as resource person for this programme.

The participants included farmers, consultants, technocrats in and around Nagapattinam, Cuddalore and Thiruvavarur District of Tamil Nadu . Dr. S. Anand updated information on emerging diseases of shrimp aquaculture industry viz AHPND (Acute Hepatopancreatic Necrosis Diseases) or EMS (Early Mortality Syndrome) and EHP (Enterocytozoon hepatopenaei). Dr, Anand also stressed the importance of implementing best management practices on farming.

*Dr. S. Kandan
Project Director
RGCA inaugurates
the workshop on
"Shrimp Diseases
and its Preventive
Measures"*

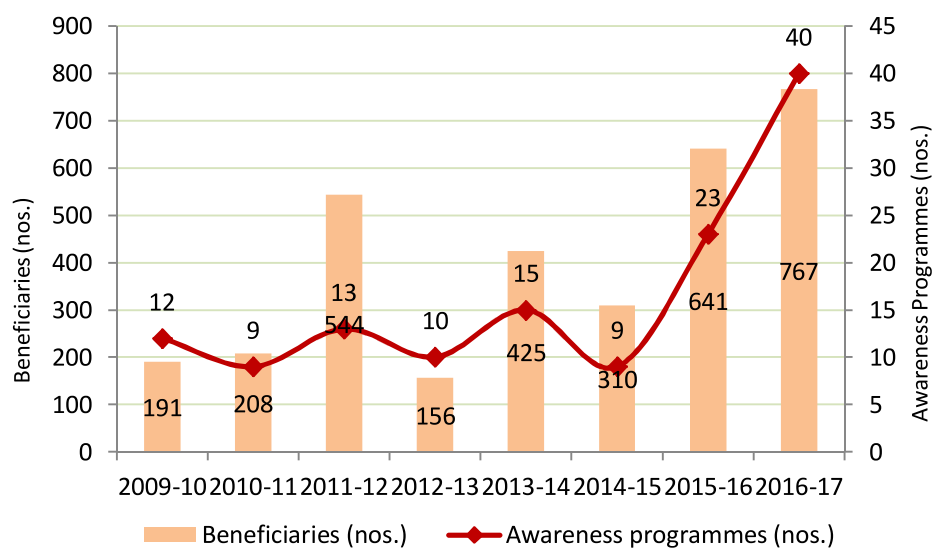




Training programmes in aquaculture conducted during the year 2016-17

Familiarization Programmes

Thirty four familiarization programmes on the "Latest Trends in Aquaculture practices of Cobia, Seabass and Mud Crab Aquaculture as well as on all new R & D activities carried out by RGCA" were conducted by the TTTAC. About 767 participants comprising of students, staff, Govt. officials, fisher folk, Self Help Group's and farmers benefitted through these programmes.



Awareness programmes conducted by the TTTAC

Hands on Training Programmes conducted Fy 2007 - 2017											
S.No	Year	Seabass Aquaculture	No. Of Beneficiaries	Mud Crab Aquaculture	No. Of Beneficiaries	GIFT Aquaculture	No. Of Beneficiaries	Other Trainings	No. Of Beneficiaries	Total Beneficiaries	Total Training Programmes
1	2007-08	5	31	1	6	0	0	0	0	37	6
2	2008-09	2	18	0	0	0	0	0	0	18	2
3	2009-10	3	20	0	0	0	0	0	0	20	3
4	2010-11	5	57	1	10	0	0	0	0	67	6
5	2011-12	3	26	2	15	0	0	1	20	61	6
6	2012-13	2	40	2	22	0	0	2	29	91	6
7	2013-14	2	26	9	133	0	0	0	0	159	11
8	2014-15	3	31	9	99	7	62	1	10	202	20
9	2015-16	6	87	11	137	11	154	5	91	469	33
10	2016-17	8	106	10	181	6	86	2	39	412	26
		39	442	45	603	24	302	11	189	1536	119

Year wise comparison of the training programmes conducted by TTAC



Central Aquaculture Genetics Laboratory

The Central Aquaculture Genetics Laboratory (CAGL), of RGCA plays a crucial role in the Genetic improvement and management of selective breeding programmes operated by RGCA. The lab implements advanced molecular genetic tools for sustainable aquaculture and develops molecular markers for aquaculture species and their products which could benefit fair trade by providing traceability, verifiability, certification, guarantee and purity.

Activities and Accomplishments:

The lab collected 145 nos. of different finfish and shell fish comprising of crabs, shrimp and groupers for species identification and population genetics studies, during the current review period. Total genomic DNA was extracted from 1126 nos. of tissue samples and 15821 PCR reactions was

performed to amplify different mitochondrial DNA regions, nuclear DNA regions and other gene specific DNA fragments including COI (Coefficient of inbreeding), Cyto-b, ATPase-6&8, ITS-1 (internal Transcribed Spacer), RFLP (Restriction Fragment Length Polymorphism), RAPD (random Amplified Polymorphic DNA), AFLP (Amplified Fragment Length Polymorphism), 18srRNA, SCAR (sequence Characterized Amplified Region) and SRAP (sequence Related Amplified Polymorphism). A total of 392 sequencing and 32 cloning reactions were carried out, by the lab. The work conducted was mainly on the sex marker development of *Macrobrachium rosenbergii* and population genetic studies of grouper and seabass using different molecular markers.



Mud crab samples received from RGCA mud crab hatchery, Thoduvai were studied for species identification by performing the specific tests (ITS-I gene profile, Species specific and PCR-RFLP). The molecular markers showing different band patterns, for different species in mud crabs are shown below-

- The lab designed the sixth generation family pedigree for Domestication of Tiger Shrimp Project (DTSP and provided the required assistance for the tilapia and BMC (L. vannamei) projects of RGCA.
- The lab also successfully completed the NABL re-accreditation process, during this period.
- Services rendered by CAGL, during 2016-17 sequencing service:
- Samples received from various organizations/institutes were (Presidency College, Chennai, MPEDA-RC and AQF-RGCA) sequenced and provided.
- Guidance for PG students for dissertation : The work entitled "Molecular markers techniques used for Grouper species identification" was guided for a student pursuing M.Sc at Dr. D.Y. Patil Institute of Biotechnology and Bioinformatics, Pune.

The evaluation stream of P.vannamei imported by BMC-L. vannamei project of RGCA, being acclimatised in tanks prior to stocking in farms at Andhra Pradesh,



Central Aquaculture Pathology Laboratory

The Central Aquaculture Pathology Laboratory (CAPL) provides disease diagnostic and pathogen surveillance services to various Projects of RGCA hatcheries, aquaculture farmers, seafood exporters and researchers. The Laboratory renders regular service for screening economically significant pathogens present in commercially valuable shellfish and finfish. Currently, the lab screens for a total of 21 pathogens (17 Shrimp pathogens, 1 Freshwater prawn pathogen, 3 Marine Finfish pathogens).

Major Activities and Accomplishments:

During the current review period, the lab processed 1670 samples and performed 13251 PCR tests. A total of 3276 specimens were processed for histology testing, 6084 samples for microbiology and 5154 tests for water quality analysis.

Under NSPAAD Surveillance, the lab screened 207 Samples from 180 farms in Tamil Nadu, 110 samples from 109 farms in Odisha for WSSV, TSV, YHV, IMNV, AHPND and EHP. Besides these, the lab

also received 387 samples under MPEDA/NaCSA/RGCA/Dept. of Fisheries, Andhra Pradesh Joint Disease Surveillance Programme and performed 1152 tests. The lab was also re-accredited by the NABL, during this period.

Capacity Building and training Programme:

- The lab actively participated with CAA and CIBA for conducting the three day long "Laboratory Recognition Programme" intended for the benefit of aquaculture sector.
- Awareness Programmes were also conducted at Odisha and Tamil Nadu that benefited 284 aqua-farmers under the NFDB funded NSPAAD Surveillance programme, funded by NFDB.

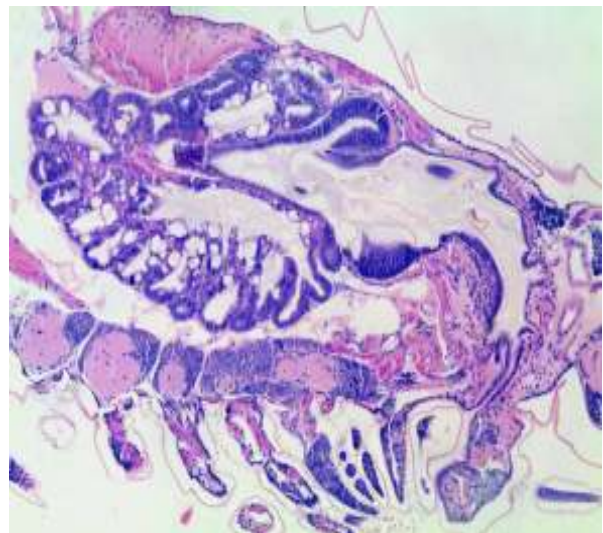
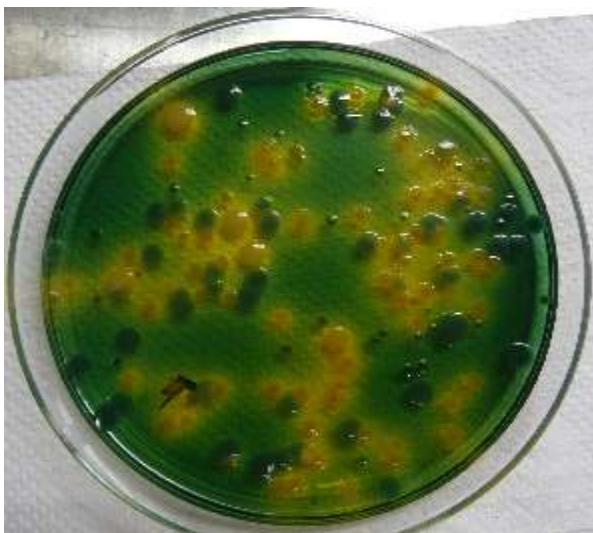
The CAPL also convened one day training programme on field level disease diagnosis, sample and sampling procedures for the benefit of officials from the Dept. of fisheries, NaCSA, MPEDA officials from Odisha, West Bengal, Andhra Pradesh and Cochin.

Programmes conducted at Tamil Nadu and Odisha, under NSPAAD surveillance

S.No	Place	Date	Farmers Benefitted
1	Chettipulam Nagapattinam Dt.	06.06.16	25
2	Avarikadu, Vedaranyam, Nagapattinam Dt.	27.01.17	26
3	Vanagiri, Sirkali, Nagapattinam Dt.	03.02.17	21
4	Sirkali, Nagapattinam Dt.	24.03.17	71
1	Chandaneswar, Balasore	30-05-2016	17
2	Balasore	14-03-2017	36
3	Chandbali, Bhadrak Dt.	15-03-2017	38
4	Contai	16-03-2017	35



Farm Surveillance



Green and Yellow colonies Histological staining-Shrimp-Head growth in TCBS agar



Aquaculture Library

Established in the year 2011, the library provides a wealth of information services and knowledge resources both in digital and print forms to the RGCA staff and as well as its users including aquaculture researchers, industry, academe, and other organizations. The library has an impressive collection of books, journals, technical reports and various publications with separate sections for farmed species across the world with special reference to species formed in Asia. It also offers Online Public Access Catalogue (OPAC) via the Institute's web site.

Resources related to various disciplines of aquaculture and fisheries, viz., shrimp and fish grow-out culture technology, hatchery technology, physiology, nutrition, biotechnology, genetics, pathology, aquaculture engineering, socio-economics and extension are also housed in this library, apart from the rare collection of books in the dedicated section of "Dr. E. G. Silas Endowment Library.

The library subscribes 25 international and 12 national journals and provides online access to the literary resources to the scientists and technical officers of RGCA.

The RGCA library also maintains regular exchange services with national and international organizations of mutual interest. Annual reports, Newsletters and Research publications of RGCA are being sent to various research organizations, Universities and Aquaculture industries and the library also receives similar publications from them.

During the current review period, the library added 137 new books and 37 journals, to its existing collection.

View of the Aquaculture Library





Infrastructure Development

The facilities created for each project are ultimate models that can be replicated by entrepreneurs of the country.

During the current review period, the civil work for Broodstock Multiplication Centre for tiger shrimp, was initiated. The facility was proposed for supplying the required number of SPF tiger shrimp broodstock to tiger shrimp hatcheries in country for the production and supply of quality seeds to farmers. In this connection, with the assistance of international experts, a state of the art BMC for tiger shrimps, was designed and the estimated cost for creating the facility was worked out. The work was executed after Tender invitation from reputed and

experienced contractors satisfying the eligibility criteria by releasing advertisement in south Indian edition of THE HINDU on 31st July 2015. Among the nine tender documents issued, 3 filled-in tenders were received before the cut-off date on 18th August 2015 at RGCA-TTAC, Sirkali.

The tender was awarded to the L1 contractor, M/s. Dee Jay Constructions, No.307/, 4th Floor, Fountain Plaza, Khaleel shirazhi Estate, Pantheon road, Egmore, Chennai-600008. Work order was issued on 16.12.2015 and Agreement was executed between RGCA and Contractor on 22.12.2015. The contractor was given 18 months to complete the work.

A view of the site, proposed for the establishment of BMC for tiger shrimp



Construction works included the following structures

S.No	STURCTURES	AREA IN SQ.MT
1	REARING TANKS 7 PACKING SECTION	5,216.00
2	TRUCK PARKING SHED	75.00
3	FOUR WHEELER PARKING SHED	93.00
4	TWO WHEELER PARKING SHED	57.00
5	EFFLUENT TREATMENT PLANT	250 MT
5a	OZONIZER SHED	48.00
6	CENTRAL STORE	156.20
7	CHILLER SHED - 4 Nos	16.00
8	BLOWER ROOM	53.50
9	OFFICE BLOCK	197.00
10	SEPTIC TANK (100 Users)	12,000 Litres
11	SERVICE BLOCK	206.20
12	DG SHED	88.30
13	WATCH TOWER - 3 Nos	2.99
14	ROAD WORK - PLOT A & B	5055.00
15	SEA WATER RESERVOIR	500 MT
16	FILTRATION SHED	77.00
17	PUMP INTAKE ROOM	30.00
18	SEA WATER OVER HEAD TANK	20 MT
19	FRESH WATER UG SUMP AND RO PLANT	20 MT
20	FRESH WATER OVER HEAD TANK	20MT
21	WORKERS DORMITORY	265.00
22	STAFF'S DORMITORY	150.00
23	CANTEEN CUM DINING	221.00
24	SCIENTIST QUARTERS	144.00
25	COMPOUND WALL-PLOT-C	1432 R.MT



Participation in Fairs and Expositions

RGCA participates in 20th India International Seafood Show 2016

RGCA actively participated and showcased its activities through live display of its own hatchery produced fingerlings and farm produced fish and shrimps in the 20th International Seafood Show IISS 2016 held on 23-25 September 2016, jointly organised by the Marine Products Export Development Authority (MPEDA) and the Sea food Exporters Association of India (SEAI) at Visakhapatnam, Andhra Pradesh. The live exhibits comprised of specimens of fingerlings of Asian Seabass, GIFT tilapia, Cobia, Pompano, adults of SPF Black Tiger shrimp, SPF P.vannamei, Scampi and Green Mangrove Mud Crabs.

The IISS is a biennial and a seafood trade fair event in Asia, and is a common forum where aqua culturists, exporters, processors, feed manufactures and other allied sectors actively participate. The stall of RGCA was not only a visual treat to the visitors but also served as an informative interface to the public through which the need for sustainable and scientific aquaculture was highlighted.

The event was well attended by the aquaculture community of the Country. A total of 166 stalls, represented by exporters and importers of Indian marine products, processors, farmers, aqua culturists, processing machinery manufacturers, and R&D institutes, participated. Around ten thousand people from various parts of India including overseas participants attended the show.

RGCA actively participated Bengal Fish Fest 2017 (06th January to 08th January), held at Nalban Food Park, Kolkata. Live mud crab brooders and crablets from Karaikal Demo Farm, RGCA along with live GIFT seeds and brooders received from Tilapia project, RGCA were displayed at MPEDA stall for propagation of mud crab and GIFT aquaculture in West Bengal.



Dr. Manmohan Singh IAS, Principal Secretary, DADF, Govt. of AP and Shri. Rama Sankar Naik IAS, Commissioner of Fisheries, Govt. of AP in RGCA stall at the India International Seafood Show



Dr. A. Jayathilak, President RGCA & Chairman MPEDA take a look at the live exhibits displayed in the RGCA stall



Awards & Recognitions

RGCA bags two awards at Biotechnology Conferences held at Chennai

The team at Aquatic Quarantine Facility for *L. vannamei* of RGCA presented scientific papers (oral and poster) at two different conferences on Biotechnology and bagged the best oral and best poster presentation awards. The paper entitled "Disease screening of the exotic shrimp *Penaeus vannamei* (Boone, 1931) at the Aquatic Quarantine Facility" presented by Ms. Remy from AQF at the DBT sponsored National Conference (NCMNP - 2016) held at Sathyabama University during 10th and 11th August 2016, bagged award for the best oral presentation under the theme Biotechnology. The paper was also shortlisted for publication in a peer reviewed scientific journal. Similarly the poster in Hindi on disease screening of *vannamei* brooders, presented by Ms. Remy and team from AQF, during the Biotechnology conference- BIOTRENDS 2016 at NIOT, Chennai from 19-21st Oct 2016, bagged the best poster award in the Hindi poster presentation cum competition.



AQF staff Mrs. M. C. Remy receives the First Prize Certificate for the Best Scientific Paper presentation (poster) in Hindi from Dr. D. D. Ozha, Chartered Chemist, Royal Society of Chemistry, London and award with cash prize from Prof. K. P. Joy, Former HOD, Centre for Advanced Study in Zoology, Banaras Hindu University and the Vice President of Society of Biotechnologists India.



AQF staff receives first prize award for Best Scientific Paper Presentation (Oral) from Dr. Mosses Inbaraj, Reader & Director of Estuarine Biological Station, Madras Christian College, Chennai. (Looks on from the stage): Dr. Radhika Rajashree, Head Centre for Ocean Research, Sathyabama University.



Publications from the RGCA Team



RGCA 2016. Annual report 2015-16
Rajiv Gandhi Centre for Aquaculture,
Sirkali, Tamil Nadu.

114 Pages; Paperback full colour
ISSN : 2347- 4483



Remany,M. C and Jaideep Kumar., [Eds]
Proceedings of the INDIA TILAPIA SUMMIT 2014 and
2nd Edition of the Dr.E.G.Silas Endowment Lecture,
18th December 2014, Vijayawada, India.
Rajiv Gandhi Centre for Aquaculture, Sirkali

138 pages; Paperback full colour
ISBN: 978-81-929898-3-9
Price Rs. 500 plus Postage Rs. 50



RGCA Newsletter No7.
Released during 2016-17

- Kumaran Ganesh. 2016. Aquaculture diversification through Asian Seabass, Lates Calcarifer. MPEDA Newsletter, 3(10): 21-25.
 - RGCA. 2016. Broodstock Multiplication in Visakhapatnam. Aquaculture Asia Pacific, 12(3): 8-11.
 - Remy, M. C, Kirubakaran, R, Daly Cyriac, Krishnakanth Varadaraju, P, Kannan, D, Jaideep Kumar, Sruthi Prem, O. C, Panda, A.K and Thampi Sam Raj Y. C. 2016. Influence of Shipment Induced Strees on Quarantine Survival of *Penaeus vannamei* (Boone, 1931) Broodstock Imported to India, p.13. In: Nandhini, N.J (Ed.), Books of Abstracts International Conference on Environmental Stress and Aquatic Animal Health (ESAAH-2016), Department of Fisheries ,Kerala, 86pp.
 - Narayanan Biju, Ganesan Sathiyaraj, Mithun Raj, Venu Shanmugam, Babu Baskaran, Umamaheswari Govindan, Gayathri Kumaresan, Karthick Kannan Kasthuriraju, Thampi Sam Raj Yohannan Chellamma. 2016. High prevalence of Enterocytozoon hepatopenaei in shrimps *Penaeus monodon* and *Litopenaeus vannamei* sampled from slow growth ponds in India. Diseases of Aquatic Organisms, 120: 225230.
 - Anup Mandal, Jaideep Kumar and Thampi Sam Raj Y. C. 2016. Status of Genetically modified Products in India, p.64-82. Santra, S. C and Malick, A (Eds). Recent Biotechnological Applications in India, ENVIS Centre on Environmental Biotechnology Department of Environmental Science University of Kalyani, West Bengal.
- GenBank submission: Accession nos.: KX866375.1, KX904714.1, KX904713.1, KX904712.1, KX904711.1, KX904710.1, KX904709.1, KX904708.1, KX904707.1, KX904706.1, KY075856.1, KY075872.1
- Remy, M. C, Daly Cyriac, Krishnakanth Varadaraju, Sruthi Prem, O,C, K Karthick Kannan, Jaideep Kumar and Thampi Sam Raj Y. C. 2017. Haematological parameters as predictive indicators of stress induced mortality in pacific White shrimp *Penaeus Vannamei* (Boone, 1931) broodstock during transboundary shipment. Indian Journal of Geo Marine Science. 46(7), pp 1440-1446.



Participations in Training Programmes, Seminars and Workshops

S. No	Name of the Staff	Training/seminar	Organized by	Duration
1	Dr. Barathkumar T.R.	DBT sponsored workshop on 'Bio-linx and PERL for Biologists'	St. Anthony's college, Shillong, Megalaya	29/08/2016 to 02/09/2016
2	Dr. Anup Mandal	Bengal Fish Fest 2017	Nalban Food Park, Kolkata	06th January to 08th January 2017
3	Mr. Mithun Raj and Mr. Karthick Kannan	National Advanced Hands-on Workshop on Real Time PCR Techniques in Biomedical Research	CIDRF, Puducherry	Dec 2016
4	Johnson D `Cruz, and Shri. K. Dhandapani	Lecture on marine fish breeding	MPEDA, HO	09.07.2016
5	Johnson D `Cruz	Workshop on Recirculatory Aquaculture System	National Centre for Aquatic Animal Health, Kochi	22.07.2016 - 24.07.2016
6	Johnson D `Cruz	Meeting of the National level committee to prepare an interim report to develop guidelines for the cage culture in inland water bodies	CIFRI, Barackpore, Kolkata	30.07.2016
7	B. Appala Naidu	Industry- Academia Interface Meeting on Restructuring of Courses"	Govt of Andhra Pradesh in collaboration with Internal Quality Assessment Cell, Andhra Layola College at Vijayawada	2nd February 2017



Participations/ Lectures delivered by RGCA team at various forums

S. No	Name of the Staff	Conference/Meeting attended	Date	Invited talks/ presentations
1	Dr. Anup Mandal	State Institute of Fisheries Technology (SIFT), Kakinada	26th April, 2016	Importance of selective breeding and quality seeds for sustainable aquaculture
2	Dr. A. K. Panda	National Surveillance Programme for Aquatic Animal Diseases	27-28 May, 2016 at NBFGR, Lucknow	Invited talk-Establishment and operation of AQF role in shrimp industry
3	M.C. Remya	National Conference on Marine Neutraceutical Products (NCMNP - 2016) held at Sathyabama University	10th and 11th August 2016	Presented a paper on Disease screening of the exotic shrimp <i>Penaeus vannamei</i> (Boone, 1931) at the Aquatic Quarantine Facility;
4	M.C. Remya, ,	Biotechnology conference BIOTRENDS 2016 at NIOT	19-21st Oct 2016	Participated and presented a Poster in Hindi "Disease screening of imported vannamei brooders"
5	Sruthi Prem O. C	Biotechnology conference BIOTRENDS 2016 at NIOT	19-21st Oct 2016	Participated in the Conference on BIOTRENDS 2016
6	Krishnakanth. P. Varadaraaju	Biotechnology conference BIOTRENDS 2016 at NIOT	19-21st Oct 2016	Participated in the Conference on BIOTRENDS 2016



Visit of Dignitaries

President RGCA Visited Various Facilities of RGCA



Pathology Lab



Experimental ponds



Dr. A. Jayathilak, IAS, observing seabass fry (left) and crab instars (right)



Dr. A. Jayathilak, IAS, on discussion with the AQF lab staff



Dr. A. Jayathilak, IAS, observing the brooders in quarantine tanks



Chairman, MPEDA & President, RGCA, Visits P. Vannamei Multiplication Centre (MC)

Project Location : Visakhapatnam



Dr. A. Jayathilak IAS, President, RGCA & Chairman, MPEDA on discussion with with RGCA officials

Dr. A. Jayathilak IAS, President, RGCA & Chairman, MPEDA visited the L.vannamei Multiplication Centre (MC) of RGCA along with Shri. B. Sree Kumar, Secretary, MPEDA, Dr. T.R. Gibin Kumar, Dy. Director, P&MP, MPEDA, Dr. Anzar Ali, Dy. Director, MPEDA and Dr. T.G. Manoj Kumar, Asst. Director, P&MP, MPEDA on 5th August 2016. Shri. Jaideep Kumar, Project Director (In-Charge), RGCA briefed the chairman on the current status of RGCA Projects. The Project Manager Lv-MC explained the activities of MC.



Dr. A. Jayathilak IAS, President, RGCA & Chairman, MPEDA in the Lv-MC facility



Seabass and Mangrove Crab Hatchery Facility, Thoduva:



Dr. ART Arasu, Rtd. Principal Scientist, CIBA and entrepreneurs visited the facility



Dr. ART Arasu and team observing larvae in LRT Section of Seabass hatchery facility



Evaluation Committee visited the hatchery facility



Dr. Santhanam, Bharathidasan University, Trichy delivers lecture on "Importance of Copepod culture for hatchery operations"



Visit of Philippines Mr. Arsenio S. Santos to the hatchery facility at Thoduva on 06.01.17



Entrepreneurs from Tamil Nadu visited hatchery facility with Project Director, RGCA



Visitors/Dignitaries at Tilapia Project, Manikonda , Andhra Pradesh

1. Konda Murali, MLC from Warangal City Telangana State visited the Tilapia farm on 5/4/2016
2. Mr Sateesh Reddy CEO, Director, Bio cenose Pvt. Ltd., Hyderabad Telangana state visited the farm on 30-7-2016.
3. A group of 24 officials from NABARD headed by Vinod Kumar Bist Deputy General Manager Lucknow Uttar Pradesh visited tilapia project site Manikonda on 7/9/2016.



Evaluation Committee Members at the facility of Sex reversal in GIFT Tilapia

- Dr Martin Kumar Fisheries Expert World bank/FAO visited Tilapia Project Farm facility along with Commissioner of Andhra Pradesh on 18/11/2016 .
- Consultant Dr Mekkawy Wagdy from WFC Malaysia visited Tilapia project facility from 30/11/2016 to 1/12/2016.
- A group of 45 members headed by P.Nagaraju Senior Assistant Director of Fisheries Department of Fisheries Karnataka State with SC/ST fishermen, members and office bearers fishermen cooperative society and fish culturists from Mandya District Karnataka visited Tilapia project Manikonda farm on 27/1/2017.

Consultant Dr Mekkawy Wagdy WFC Malaysia with the tilapia project team





*Shri Rama Sankar Naik, the commissioner of Fisheries . Govt. of Andhra Pradesh
visited the Tilapia project Facility at Manikonda Village, Andhrapradesh*



Dr.S.Kandan ,ProjectDirector RGCA , with the NBFGR personnel



Aquatic Quarantine Facility for *P.vannamei*, Chennai



Dr. J. K. Jena, DDG (Fy), ICAR (right) interacting with the AQF staff (visited on 13.5.17)



NFDB officials at AQF cubicles



Members of Evaluation Committee in the AQF lab (Visited on 18.10.16)

NFDB officials (right side at the desk)- Dr (Mrs) M. Percis, Senior executive (Tech), and Sri. Periyakaruppan, Consultant (Tech) at a technical presentation by AQF staff (visited AQF 29.7.16 to 30.7.16)





RGCA Meetings

Two meetings of Executive Committee were conducted during the year 2016-17.

54th EC of RGCA

54th Executive Committee Meeting of RGCA held on the 28th September 2016 at MPEDA HO, Kochi. The following members attended the meeting

Members Present:

1. Dr. A. Jayathilak, IAS, President, RGCA
2. Dr. Joy Krushna Jena, Deputy Director General (Fy), ICAR
3. Dr. K.K. Vijayan, Director CIBA
4. Dr. A. S. Ninawe, Senior Advisor, DBT
5. Shri. B. Sreekumar, Secretary, MPEDA
6. Smt. Noorjahan Beevi, Addl. Director, Dept. Of Fisheries, TN (for Commissioner of Fisheries, Tamil Nadu)
7. Smt. E. V. Deepa, CAO, MPEDA
8. Shri. Suguna Prasad, Regional Executive, ADAK
9. Shri. Jaideep Kumar, Project Director (I/c), RGCA

55th EC of RGCA

55th EXECUTIVE COMMITTEE MEETING OF RGCA HELD ON THE 29TH MARCH 2017 AT MPEDA HO, KOCHI. The following members were attended the meeting.

Members Present:

1. Dr.A Jayathilak, IAS, Chairman, MPEDA & President, RGCA
2. Dr.K.K Vijayan, Director, CIBA
3. Shri B.Sreekumar, Secretary, MPEDA
4. Shri J Chandrasekar, Director of Fisheries,, A & N Islands
5. Shri Natarajan, Deputy Director of Fisheries & Fishermen Welfare, Govt of Puducherry (attended in place of Shri A.Vincent Rayar, Director)
6. Shri U.S Sajeev, Executive Director, ADAK, Trivandrum
7. Smt.E.V Deepa, Chief Accounts Manager, MPEDA
8. Dr.S.Kandan, Project Director, RGCA

General Body Meeting

The 23rd Annual General Body Meeting of RGCA was held on 28nd September 2016 at MPEDA, HO, Kochi. The following members were attended the meeting.

Members Present:

1. Dr. A. Jayathilak, IAS, President, RGCA
2. Dr. Joy Krushna Jena, Deputy Director General (Fy), ICAR
3. Dr. K.K. Vijayan, Director CIBA
4. Dr. A. S. Ninawe, Senior Advisor, DBT
5. Shri. B. Sreekumar, Secretary, MPEDA
6. Smt. Noorjehan Beevi, Addl. Director, Dept. Of Fisheries, TN (for Commissioner of Fisheries, Tamil Nadu)
7. Smt. E. V. Deepa, CAO, MPEDA
8. Shri. K. J. Antony, Joint Director (M), MPEDA
9. Dr. S. Vijayakumar, Deputy Director (Aqua), MPEDA RC, Nagapattinam
10. Shri. Suguna Prasad, Regional Executive, ADAK
11. Shri. Jaideep Kumar, Project Director (I/c), RGCA

SCIENTIFIC ADVISORY COMMITTEE MEETING

Two Meetings of Scientific Advisory Committee of RGCA were held during the year 2016-17.

31st SAC meeting

31st Meeting of Scientific Advisory Committee of RGCA held on 13th May'2016 at Hotel Abu Sarovar Portico, Chennai. The following members were attended the meeting.

Members Present

1. Dr. George John, Vice Chancellor, Birsa Agri. University, Ranchi (Chair)
2. Dr. Joy Krushna Jena, DDG (Fy), ICAR
3. Dr. T. Balasubramaniyan, Former DEAN, CAS Marine Biology, Parangipettai
4. Dr. T.C. Santiago, Retd. Principal Scientist, CIBA
5. Dr. E. Vivekanandan, Retd. Principal Scientist, CMFRI

Ex. Officio Member Secretary

Shri. Y.C. Thampi Sam Raj, Project Director, RGCA

32nd SAC Meeting

32nd SCIENTIFIC ADVISORY COMMITTEE MEETING OF RGCA HELD ON 28th SEPTEMBER 2016 AT MPEDA HO, KOCHI. THE FOLLOWING MEMBERS WERE ATTENDED THE MEETING.

Members

1. Dr. E.G Silas, Chairman, SAC
2. Dr. Joy Krushna Jena, DDG (Fy), ICAR
3. Dr. George John, Vice Chancellor, Birsa Agri. University, Ranchi
4. Dr. A. Gopalakrishnan, Director, CMFRI, (ICAR)
5. Dr. A.S. Ninawe, Sr. Advisor, DBT, New Delhi
6. Dr. T. Balasubramaniyan, Former DEAN, CAS Marine Biology, Parangipettai
7. Dr. T.C. Santiago, Retd. Principal Scientist, CIBA
8. Dr. E. Vivekanandan, Retd. Principal Scientist, CMFRI

Ex. Officio Members

Dr. A. Jayathilak, IAS, President RGCA

Ex. Officio Member Secretary

Shri. Jaideep Kumar, Project Director I/c, RGCA



Budget and Expenditure

The Sanctioned Budget of Rs. 2594 lakhs was earmarked for the projects during 2016-17, Rs.225 lakhs for capital expenditure and Rs.2729 lakhs for recurring expenditure.

The fund available during the financial year 2016-17 was Rs. 7595.87 lakhs:

RGCA have the opening balance as on 01.04.2016 towards of cash in hand Rs. 2,445 & Cash at bank of Rs. 569.39 lakhs are respectively. MPEDA has sanctioned to RGCA for transfer of fund during the financial year 2016-17 was Rs. 2950 lakhs for meeting the expenditure of on-going RGCA projects except Aquatic Quarantine facility of Neelankarai, Chennai. The Grand-in-aid fund from NBFGR was Rs. 28.43 lakhs towards meeting the expenditure for surveillance of Shrimp diseases works at Central pathology lab. The Reimbursement of Tilapia Cage Development and Deployment expenses of Rs. 106.42 lakhs received from MPEDA on 20/09/2016. During the financial year 2016-17 RGCA has realised some funds from the closure of STDR and R&D income for Rs.

1,667.05 lakhs. RGCA projects have been received income amount during the year was Rs. 2,201.73 lakhs. The Quarantine Bookings received in advance by AQF project during the financial year 2016-17 was Rs. 58.33 lakhs. Income of Rs. 7.86 lakhs has already booked in the last year Income statement; the same has been received during the financial year 2016-17 towards sale of Tilapia Seeds. Discarded of assets due to unused/non-repairable was Rs. 0.05 lakhs. The refund for the TDS amounts has received from the Income Tax Department Rs. 2.91 lakhs and Refund of Temporary Advances such as festival advance; guest room rent etc., for the year 2016-17 was Rs. 3.68 lakhs. The Total fund available during the financial year was Rs. 7595.87 lakhs as tabulated into below:

S.No	Particulars	Inlakhs
1	Opening balance of Cash-in-hand as on 01.04.2016	0.02
2	Opening balance of Cash-at-bank as on 01.04.2016	569.39
4	Funds received from MPEDA	2,950.00
5	Grant-in-aid fund from NBFGR	28.43
6	Reimbursement from MPEDA towards Tilapia Cage Development & Deployment expenses at AP	106.42
7	Funds realised closure of STDR/income	1,667.05
8	Income received: Sale of R&D products, Scrap etc., and including interest earned on Fixed deposit accounts	2,201.73
9	Quarantine bookings received-in-advance	58.33
10	Accounts receivable towards credit sale of R&D products	7.86
11	Asset Discarded	0.05
12	TDS refund from the income tax department	2.91
13	Refund of Temporary Advances	3.68
Total Fund		7,595.87

Total Expenditure during the financial year 2016-17 was Rs. 6399.95 lakhs:

RGCA has incurred total expenditure of Rs. 4694.60 lakhs towards investments Rs. 795.14 lakhs and recurring expenditure of Rs. 3899.46 lakhs. The Settlement of Outstanding liability & part advance amount released by RGCA during the financial year was Rs. 158.18 lakhs. The Advance has been

made during the financial year was Rs. 13.44 lakhs towards deposits for Telephone, Electricity, Rent, etc. Current asset as made during the financial year 2016-17 was Rs. 1533.72 lakhs in connection with new deposit accounts & renewal of Term Deposits/ Electricity Deposit accounts. The Total expenditure was Rs. 6399.95 lakhs as tabulated into below:

S.No	Particulars	In lakhs
1	Investments of RGCA projects during the financial year (2016-17)	795.14
2	Recurring expenditure of RGCA projects during the financial year (2016-17)	3,899.46
3	Settlement of liability & part advance paid during the financial year (2016-17)	158.19
4	Advance has been made during the financial year (2016-17)	13.44
5		1,533.72
Total Expenditure		6,399.95

Closing balance as on 31/03/2017 was Rs. 1195.92 lakhs which includes cash- in- hand Rs. 114 and Cash at bank of Rs. 1195.92 lakhs are respectively.

RGCA Foundation (Corpus Fund)

RGCA is maintaining the Corpus Fund deposit accounts at Tamil Nadu Power Finance and Infrastructure Development Corporation Limited, Chennai. The deposit account details are given below:

S. No	FDR No.	Deposit Amount	Date of Deposit	Dt. Of Maturity	Accrued Interest earned upto 31/03/2017	Deposit Closing Balance as on 31/03/2017
1	CAA704223	25,00,00,000	03/02/2016	03/02/2019	2,87,40,156	27,87,40,156
2	CAA709144	52,15,85,052	10/04/2016	10/04/2019	5,04,15,043	57,20,00,095
Total		77,15,85,052			7,91,55,199	85,07,40,251

The above mentioned accumulated Corpus fund of Rs. 52.16 Crores and additional fund sanction for Rs. 25 crores was deposited with TUFIDCO at annual interest of 9.5% for a period of 3 years. The amount at maturity would be Rs. 69.28 Crores and Rs. 33.14 crores totalling of Rs. 102.42 Crores

Head of The Institution

Dr. A. Jayathilak, IAS- President RGCA

Current RGCA - Staff Details - Regular/ Deputation /Contract Employee

S. No	Name of the Staff	Designation	Employment Basis
1	Y.C Thampi Samraj (up to June 2016) Dr.S.Kandan "From January 2017"onwards	Project Director Project Director	ON CONTRACT ON DEPUTATION FROM MPEDA
2	S.KRISHNADAS	Chief Accounts Manager	On Contract
3	JAIDEEP KUMAR	Deputy Project Director	Regular Employee-rgca
4	V. N. BIJU	Project Manager (cpl)	On Deputation From Mpeda
5	B THIRIPURASUNDARI	Assistant Project Manager (p&a)	Regular Employee-rgca
6	K RAJENDRAN	Administrative Assistant	Regular Employee-rgca
7	U CHINNADURAI	Driver	Regular Employee-rgca
8	D V S N RAJU	Assistant Project Manager	Regular Employee-rgca
9	D RAJESH	Assistant Accounts Manager	Regular Employee-rgca
10	K ARUMUGAM	Accountant	Regular Employee-rgca
11	RAJEESH G	Assistant Accounts Manager	Regular Employee-rgca
12	ANUP MANDAL	Project Manager-cgl	Regular Employee-rgca
13	N BABU RAO	Assistant Project Manager	Regular Employee-rgca
14	K MAHESWARAN	Accountant	Regular Employee-rgca
15	K MARIESWARAN	Junior Project Manager (p&a)	Regular Employee-rgca
16	M MAHADEVAN	Accountant	Regular Employee-rgca
17	K.M.ANJALI	Assistant Techincal Manager	Regular Employee-rgca
18	P.S.SOBHA	Assistant Techincal Manager	Regular Employee-rgca
19	B.BABU	Assistant Techincal Manager	Regular Employee-rgca
20	MITHUN RAJ	Assistant Techincal Manager	Regular Employee-rgca
21	A.ELAMARAN	Assistant Project Manager (works)	Regular Employee-rgca
22	S.John	Library Assistant	Regular Employee-rgca
23	K.V Ravikumar	Accountant	Regular Employee-rgca
24	L.Ruban	Assistant Techincal Manager	Regular Employee-rgca
25	K.Karthick Kannan	Assistant Techincal Manager	Regular Employee-rgca
26	E.Anananda Jothi	Assistant Techincal Manager	Regular Employee-rgca
27	L.Mohan Kumar	Assistant. Librarian	Regular Employee-rgca
28	G.Sathiyaraj	Assistant Techincal Manager	Regular Employee-rgca

S. No	Name of the Staff	Designation	Employment Basis
29	V.Shanmuga Arasu	Assistant Project Manager	Regular Employee-rgca
30	G.Uma Maheswari	Assitant Techincal Manager	On Contract
31	P.Babu	Electrician-cum-mechanic	On Contract
32	Edwin Joseph	Project Manager-aqua.lib	On Contract
33	R.Kamalraj	Jr.system Analyst	On Contract
34	R Ganeshamurthy	Assitant Techincal Manager	On Contract
35	K Ajeeth	Technician	On Contract
36	Lanka Praveen	Technician	On Contract
37	Anu C Jose	Assitant Techincal Manager	On Contract
38	B.ANANTH	Accountant	On Contract
39	S.RENUGADEVI	Technician	On Contract
40	K.GAYATHRI	Technician	On Contract
41	M.PRIYA	Technician	On Contract
42	T.R.BARATH KUMAR	Assitant Techincal Manager	On Contract
43	NIMMY JOUSY	Assitant Techincal Manager	On Contract
44	VISHNUPRASAD A.R	Accountant	On Contract
45	S.ELANGESWARAN	Apm -It	On Contract
46	VR. MANIMARAN	Project Manager (works)	On Contract
47	SURYA A.B	Technician	On Contract
48	RESHMA	Technician	On Contract

HHSSPU-II (NRC) Chirala

S. No	Name of the Staff	Designation	Employment Basis
49	G. Ramar	Project Manager	On Deputation From Mpeda
50	Ratkanta Mahapatra	Assistant Project Manager	On Contract
51	Susanta Kumar Patra	Assistant Project Manager	On Contract
52	Janaki Ramaiah	Assistant Project Manager (p&a)	On Contract
53	Kiran Pilli	Technician	On Contract
54	Uma Maheswara Rao	Assistant Project Manager	On Contract

DTSP-Andaman

S. No	Name of the Staff	Designation	Employment Basis
55	THINESH SANTHAR	Project Manager	Regular Employee-rgca
56	S NAGARAJ	Assistant Project Manager	Regular Employee-rgca
57	P BANGARAJU	Junior Project Manager	Regular Employee-rgca
58	G SIVA KRISHNA	Assistant Technical Manager	Regular Employee-rgca
59	BINOD GHARAMI	Facility Manager (ele)	Regular Employee-rgca
60	M.SHAILENDER	Assistant Project Manager	Regular Employee-rgca
61	PRAVEEN RAJ.K	Assistant Project Manager (p&a)	Regular Employee-rgca
62	K.P.SARMAL	Assistant Technical Manager	Regular Employee-rgca
63	D.SILAMBARASAN	Assistant Technical Manager	Regular Employee-rgca
64	Boorada Kishor	Assistant Technical Manager	Regular Employee-rgca
65	Nayeem Faud	Accountant	On Contract
66	Daymay Haldar	Assistant Facility Manager (electrical)	On Contract
67	P.Krishna Swamy	Electrical -cum- Mechanic Supervisor	On Contract
68	R.Rajan	Assistant Project Manager(civil)	On Contract
69	Sheetal Dilip	Technician	On Contract
70	John C.E	Assistant Project Manager	On Contract
71	I.Rakkaiah	Assistant Project Manager	On Contract
72	Sarun John Roay	Technician	On Contract
73	J.Ganesh	Technician	On Contract
74	T.Yellam Naidu	Technician	On Contract
75	Abhisheak Shaik	Technician	On Contract
76	SANKARARAPANDI	Technician	On Contract
77	RACHAEL	Technician	On Contract
78	RAJESH RAO	Electrical -cum- Mechanic Supervisor	On Contract

DTSP-SBNPC

S. No	Name of the Staff	Designation	Employment Basis
79	B SRIKANTH	Project Manager	Regular Employee-rgca
80	Y NARAYANA SWAMY	Assistant Technical Manager	Regular Employee-rgca
81	Srinivasa Rao	Purchase-cum-stores Assistant	On Contract
82	Haraprasad Panigrahy	Electrical -cum- Mechanic Supervisor	On Contract
83	Ganeshwar Behera	Assistant Facility Manager (civil)	On Contract
84	Kanakam Suresh	Assistant Technical Manager	On Contract
85	K.E.RAJKUMAR	Assistant Project Manager	On Contract

DTSP-BMC, Kanyakumari

S. No	Name of the Staff	Designation	Employment Basis
86	Dr.P. Jayagopal	Senior Project Manager	On Deputation From Mpeda
87	C.ELAMPARTHI	Assistant Project Manager (works)	Regular Employee-rgca
88	G.MATHAN	Accountant	On Contract

RGCA L.vannamei Multiplication Centre, Bheemunipatnam, Vizag

S. No	Name of the Staff	Designation	Employment Basis
89	H DINESH KUMAR	Project Manager	Regular Employee-rgca
90	A. Anand Kumar	Assistant Project Manager	On Deputation From Mpeda
91	MICHAEL RENOLD BINO P	Accountant	Regular Employee-rgca
92	Ch.Santhosh Kumar	Assistant Technical Manager	Regular Employee-rgca
93	Ms.Varanasi Laxmi	Assistant Technical Manager	Regular Employee-rgca
94	Ranjan Kumar Patra	Assistant Project Manager	On Contract
95	Lanka Gurumurthy	Technician	On Contract
96	Anish.G	Purchase-cum-stores Assistant	On Contract
97	D.V Ravi Kishor	Technician	On Contract
98	Raju Kari	Technician	On Contract
99	Kongarapu Simhachalam	Assistant Technical Manager	On Contract
100	L.Sunil Kumar	Technician	On Contract
101	R.FEROZE RAJAN	Assistant Facility Manager (electrical)	On Contract
102	Appalanagaraju Thiumalaraju	Electrical -cum- Mechanic Supervisor	On Contract
103	P.L Arun	Electrical -cum- Mechanic Supervisor	On Contract

RGCA Artemia Project, Tuticorin

S. No	Name of the Staff	Designation	Employment Basis
104	M SAMAYA KANNAN	Assistant Project Manager	Regular Employee-rgca
105	S BALACHANDAR	Assistant Technical Manager	Regular Employee-rgca
106	S.MOOVENDHAN	Assistant Technical Manager	Regular Employee-rgca
107	J. Mohan Raj	Accountant	Regular Employee-rgca
108	SR SUNITH SHINE	Assistant Technical Manager	On Contract
109	VISHNURAJ.R.S	Technician	On Contract

RGCA Seabass Hatchery Projects, Thoduvai

S. No	Name of the Staff	Designation	Employment Basis
110	K. Ganesh	Project Manager	On Deputation From Mpeda
111	R SENTHILKUMAR	Electrical -cum- Mechanic Supervisor	Regular Employee-rgca
112	A S VASUDEVAN	Electrical -cum- Mechanic Supervisor	Regular Employee-rgca
113	SUJITH P U	Accountant	Regular Employee-rgca
114	M SARAIVANAN	Assistant Techincal Manager	Regular Employee-rgca
115	D Y S KRISHNA MURTHY	Assistant Project Manager	Regular Employee-rgca
116	K.V.GANGADHARAN	Assistant Techincal Manager	Regular Employee-rgca
117	R.Murugesan	Assistant Techincal Manager	On Contract
118	P.SEETARAM	Technician	On Contract
119	SARI MOL. C.N	Technician	On Contract

RGCA Mudcrab Hatchery Projects, Thoduvai

S. No	Name of the Staff	Designation	Employment Basis
120	S. Arulraj	Assistant Project Manager	On Deputation From Mpeda
121	K.Velmurugan	Assistant Techincal Manager	Regular Employee-rgca
122	S.Viswanathan	Assistant Techincal Manager	Regular Employee-rgca
123	P.B.AJITHKUMAR	Assistant Project Manager	On Contract
124	PRAVEENA SOMAN.K	Assistant Techincal Manager	On Contract

RGCA AQUATIC QUARANTINE FACILITY/SBNPC, Neelankarai, Chennai

S. No	Name of the Staff	Designation	Employment Basis
125	D KANNAN	Assistant Project Manager	Regular Employee-rgca
126	K SANKAR	Purchase-cum-stores Assistant	Regular Employee-rgca
127	A K PANDA	Project Manager	Regular Employee-rgca
128	DALY CYRIAC	Assistant Technical Manager	Regular Employee-rgca
129	M C REMANY	Project Manager-srpm	Regular Employee-rgca
130	K AADHAVAN	Facility Manager	Regular Employee-rgca
131	ASWINI KUMAR	Assistant Technical Manager	Regular Employee-rgca
132	ERRA SURESH BABU	Assistant Technical Manager	Regular Employee-rgca
133	RAVIKUMAR VINJARAPU	Assistant Technical Manager	Regular Employee-rgca
134	P.KrishnaKanth Varadha Raju	Assistant Technical Manager	Regular Employee-rgca
135	Sruthi Prem	Assistant Technical Manager	Regular Employee-rgca
136	Amal Joseph	Accountant	On Contract
137	K.Ganesan	Electrical -cum- Mechanic Supervisor	On Contract
138	P.Thirunavukkarasu	Assistant Technical Manager	On Contract
139	G.Srinivasa Rao	Technician	On Contract
140	Arun Babu	Assistant Facility Manager (electrical)	On Contract
141	Sandeep K.S	Accountant	On Contract
142	M.SURESH	Technician	On Contract

RGCA SCAMPI Broodstock Development Project, Kankipadu, Vijayawada

S. No	Name of the Staff	Designation	Employment Basis
143	LAKSHMI NARAYANA KADIMI	Assistant Technical Manager	Regular Employee-rgca
144	SURESH BETHALA	Assistant Technical Manager	Regular Employee-rgca
145	RAMU G	Accountant	Regular Employee-rgca
146	K.KANAKA CHINTAIAH	Assistant Technical Manager	Regular Employee-rgca
147	P.Srinu	Technician	Regular Employee-rgca
148	S.Kannan	Assistant Project Manager	On Contract
149	Hanok Kumar Indupalli	Technician	On Contract
150	Vikasri Godi	Technician	On Contract
151	G.P Subba Rao	Electrical -cum- Mechanic Supervisor	On Contract
152	K.NAGALAKSHMI	Technician	On Contract

RGCA Tilapia Project, Kankipadu, Vijayawada

S. No	Name of the Staff	Designation	Employment Basis
153	JOHNY T VARGHESE	Junior Project Manager	Regular Employee-rgca
154	P SRINIVASA RAO	Assistant Project Manager	Regular Employee-rgca
155	GUNASEKARAN U	Assistant Technical Manager	Regular Employee-rgca
156	V SUBASH	Accountant	Regular Employee-rgca
157	B.APPALA NAIDU	Assistant Project Manager	Regular Employee-rgca
158	MATHEWS VARKEY	Assistant Project Manager	Regular Employee-rgca
159	M.GNANAVEL	Assistant Technical Manager	Regular Employee-rgca
160	P.S SIVAKUMAR	Assistant Technical Manager	Regular Employee-rgca
161	G.SENTHIL	Technician	Regular Employee-rgca
162	KOTHARU ROHINI KUMAR	Electrical -cum- Mechanic Supervisor	On Contract
163	LAKSHMANARAO NAYUDU	Assistant Technical Manager	On Contract

RGCA Marine Fin Fish Hatchery Project, Pozhiyoor, Thiruvananthapuram

S. No	Name of the Staff	Designation	Employment Basis
164	Shri. Johnson D'Cruz	Project Manager	On Deputation From Mpeda
165	K DHANDAPANI	Assistant Project Manager	Regular Employee-rgca
166	G KARTHIK	Accountant	Regular Employee-rgca
167	ARVIND V S	Assistant Technical Manager	Regular Employee-rgca
168	A.PACKIARAJ	Technician	Regular Employee-rgca
169	ES Sajith	Electrical -cum- Mechanic Supervisor	On Contract
170	VIJAYAN-C	Technician	On Contract
171	RAJAKUMARAN. P	Assistant Technical Manager	On Contract

RGCA Marine Fin Fish Hatchery Project, Muttom

S. No	Name of the Staff	Designation	Employment Basis
172	DAMODAR P N	Assistant Project Manager	Regular Employee-rgca
173	V PHARTHASARATHY	Accountant	Regular Employee-rgca
174	Saravanan.M	Assistant Technical Manager	On Contract

RGCA Grouper Project, Andaman

S. No	Name of the Staff	Designation	Employment Basis
175	ELUMALAI G	Accountant	Regular Employee-rgca
176	S.VIJAYAKUMAR	Assistant Techincal Manager	Regular Employee-rgca
177	T.MARUDHUPANDI	Assistant Project Manager	On Contract

RGCA S Farm Project

S. No	Name of the Staff	Designation	Employment Basis
178	SHRI. S. PANDIARAJAN	Project Manager	On Deputation From Mpeda
179	SHRI. B. NARASIMHA RAO	Project Manager	On Deputation From Mpeda
180	G.K.DINAKARAN	Assistant Project Manager	Regular Employee-rgca
181	K SATEESH KUMAR	Assistant Techincal Manager	Regular Employee-rgca
182	RAJARAJAN S V	Accountant	Regular Employee-rgca
183	SUNDHARESAN T	Assistant Techincal Manager	Regular Employee-rgca
184	A.KUPPAN	Technician	On Contract

Addresses of RGCA Projects

Administrative Complex

Project Director

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Assistant Director

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Seabass Hatchery Project

Assistant Project Manager

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Mud Crab Hatchery Project

Asst. Project Manager

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Shrimp Breeding Projects

Senior Project Manager

Shrimp Breeding Projects
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Domestication of Tiger Shrimp Project (NBC)

Project Manager

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Pilot Scale Broodstock Multiplication Centre

Asst. Project Manager

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High Health Shrimp Seed Production Unit Chirala Project Manager

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Pre-Primary and Primary Quarantine Unit

Asst. Project Manager

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L.vannamei Broodstock Multiplication Centre**Assistant Project Manager**

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Aquatic Quarantine Facility for L. vannamei**Project Manager**

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Aquatic Quarantine Facility for L. vannamei
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Scampi Broodstock Development Project**Assistant Project Manager**

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Tilapia Project**Assistant Project Manager**

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Scampi Broodstock Development & Tilapia Project
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Marine Finfish Hatchery Project**Assistant Project Manager**

Rajiv Gandhi Centre For Aquaculture
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Infrastructure Development Division**Assistant Project Manager**

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Technology Transfer & Training Division**Assistant Project Manager**

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GIFT 60 FAM Nursery Rearing In Hapas