



Dr. K.K. Vijayan

# BRAQCON 2019 WILL BRING THE AQUACULTURE WORLD TO INDIA

says Dr. K.K. Vijayan, Director CIBA

**D**r. Vijayan, opens up to the AO team on the upcoming mega event organized by CIBA - BRAQCON 2019, to provide our readers an insight into the event which is the first of its kind to happen in India. Dr. Vijayan also speaks on current activities of CIBA, the need for selective breeding programmes and much more. Read to know further.....

Further, AO takes special pride in sharing the details of BRAQCON with our readers, as the event is being hosted by one among the premier aquaculture research institutes founded by AO mentor and well-wisher, Late Dr. E. G. Silas.

**Aquaculture Outlook: We have seen latest announcement on BRAQCON 2019 and see some very big names in the sector and an interest among farmers to attend. It looks like this is going to be one of the Mega events in the Indian Aquaculture sector. How did this all come about sir? Is this BRAQCON concept your brainchild?**

**Dr. K.K. Vijayan:** Firstly, let me say that over the years, we have been observing and participating in several conferences related to Aquaculture that is being organized at the global level. While many of them are general, accommodating all aspects of aquaculture, several of them are mainly concerned with Shrimp

farming and others that are specific for different fish species, culture systems or products. But we see that till date there are no international conferences specifically for Brackishwater aquaculture. With India presently being the world leader in Shrimp production, it is only befitting that a world conference is held here with a theme on Brackishwater aquaculture.

Secondly, institutions in India are partners to several global events such as the Asian Pacific Aquaculture organized by the World Aquaculture Society, Asian Aquaculture Society etc. But yet, we still do not have an aquaculture event that we can call our own. The Inaugural edition of IndAqua organized by MPEDA under the leadership of Dr. Shakthivel in the early 90's was the first big event that India organized. But subsequently, I feel that there is no conference that is a representation of India at the global level and we want to do just that through BRAQCON.

CIBA itself is a unique national institution for Brackishwater Aquaculture. You must be aware that it was conceived due to the vision of the legendary Dr. Silas. I don't think that there is a similar institution in any other part of the world. So, it was with this background in mind that we decided to organize a world event on Brackishwater Aquaculture covering all systems of Aquaculture and all species that are suitable brackishwater aquaculture with supporting aspects such as breeding, genetics and other aspects including the ecosystem. I was really hopeful that organizations like SAP and SEAI would join CIBA in this initiative, but

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I am sure that by the next edition of this event, all such key organizations would also come forward to support BRAQCON.

### **AO: Is BRAQCON going to be a regular feature now?**

**Dr. KKV:** Yes, BRAQCON is going to be a biennial event. We have conceived it in such a way. There are several events happening in India and we did not want BRAQCON to coincide with any of them. We also thought that the month of January would be ideal in view of the pleasant weather conditions in Chennai and also because most of the stakeholders of the sector would be available to participate before the beginning of their busy season. A Farmers' Conclave preceding the event was conceived after much thought and is intended to lure as many genuine farmers as possible. We intend to have the Farmers' conclave as an annual affair as we feel that they have to be updated more often. We are expecting a participation of around 500 farmers with around 200 from Andhra Pradesh, 100 from Tamil Nadu and the rest from the other states of the country. We are a little hard pressed on generating funds for Farmers conclave. The Govt. of Andhra Pradesh has been very supportive for the event with a funding of Rs. 5 Lakhs and sponsoring around 100 farmers. Tamil Nadu Govt. and a few other states are also very positive and have also assured support. We are keeping our fingers crossed. Shri. Radha Mohan Singh, Union Minister of Agriculture and Farmers welfare will be inaugurating the programme and Dr. Swaminathan would be the Guest of Honour for the Farmers conclave.

CIBA has been working with farmers across the country through the NICRA (National Innovations in Climate Resilient Agriculture) project our field centres for several interaction programmes, demonstrations and novel initiatives such as partnership farming. We also have a mobile app that several of the farmers use. So we have a good bonding with the farmers and hope that they would be attending the conclave.

### **AO: But most of these seminars usually contain information that most farmers find difficult to understand or comprehend. Does the Conclave**

### **have anything for our regular shrimp farmers?**

**Dr. KKV:** We clearly understand that. The presentations at the Farmers Conclave will be at a level that the farmers would be able to understand easily, containing only the information that they are usually interested in knowing. Besides, the conclave will also have progressive and successful farmers in all species from different states. Farmer entrepreneurs can deliver their own presentation in English or their own language. We have made arrangements to translate it for the other farmers.

There is plenty of information for the shrimp farmers also. Further, the first session on the next day, i.e., on the 23<sup>rd</sup> is on production systems where we focus on the way forward for the sector. Farmers interested in staying back and attending these sessions can do so. Here, they would have the opportunity to meet and interact other farmers and entrepreneurs from all over the country and also from Bangladesh, Myanmar and Sri Lanka. Several entrepreneurs who have tied up with us for technical support on Feed mills, Seabass Hatchery, Seabass & Milkfish farming etc., would be attending and presenting their experiences. They will carry back their experience here to all the states across India. Important sessions with national and international experts discussing on disease and management would certainly be an opportunity for all to update themselves on global developments.

BRAQCON will also have a **"Start Up Meet"** where all successful entrepreneurs who achieved success after adopting new technologies developed by CIBA would be invited to speak and make presentations on their experiences. The feed plants established by big shrimp farmers in Haryana and Bapatla are examples of successful entrepreneurship in this field. We will also have a platform to support entrepreneurs interested in adopting these technologies including establishing diagnostic labs. Once these private entrepreneurs become successful, we will encourage them to commit towards corporate social responsibility (CSR) where they should hand hold with small farmers or entrepreneurs and assess them in practicing sustainable aquaculture.

### **AO: From an industry point of**

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**view, we would like to know if the presentations would be purely scientific or would have more information that commercial farmers and hatcheries in the brackishwater aquaculture could gain.**

**Dr. KKV:** It would be a combination of both. We have conceived BRAQCON as having two segments - One is the Farmers' Conclave and the second is a purely scientific congress. At CIBA, though we also do basic research, our focus is on applied aspects relevant to the requirements of the sector. For example, in nutrition, though we do a lot of research on profiling etc., which is essential for understanding, our connection to the sector is through feed formulation and the feed technology that we tailor make for our sector. Three days of BRAQCON will deal with both basic as well as applied research. Each session will have both International and National speakers of repute, presenting their findings. With the current response, anticipate a time constraint as we will have atleast 10 presentations per session in addition to the two main presentations.

**AO: Will you be having parallel sessions in different halls?**

**Dr. KKV:** As far as possible, we would like to accommodate all the sessions in the main hall itself. We would like all the delegates to be able to attend all the presentations. We have attended several international conferences where parallel sessions are held and sometimes you hardly find any attendance in some of the parallel sessions. At BRAQCON, only the "Start Up Meet" and "Food Safety session" would be held as parallel sessions as they cater to a specific group of stakeholders.

**AO: How is the response to BRAQCON so far sir? How many delegates do you expect to participate in the event? How many can you accommodate?**

**Dr. KKV:** The international response has been very good because they understand this unique theme. The

main purpose of BRAQCON is to bring all the industry players, farmers, researchers and other stakeholders together. Though the response from the industry to this event within our country has been a little slow, I am sure that the 2nd edition of this conference would be owned by the industry and all the stakeholders with a massive involvement from their side. The international community have already noticed it. We expect close to 500 delegates each for the main event as well as the Farmers Conclave.

**AO: You have been able to rope in some of the biggest names from the Global Aquaculture sector to participate. How did you manage to do that?**

**Dr. KKV:** Yes, through our earnest efforts, we have been successful in getting people like Dr. Wyban, Dr. Boyd, Dr. Chamberlin and a horde of other big global names to participate in the event. Some of them have graciously readily agreed to come. We would have been able to bring in more international scientists if we had received a little more support from the industry.

We have also tied up with an International Journal with a good impact factor - "Journal of Coastal Research" that would be publishing the presentations made during the event. This is to ensure that the presentations of researchers will get a value and not go wasted. Usually, there is not much value academically for these seminar presentations. So, most researchers from various institutes in the country view BRAQCON as a value added conference and are coming forward to participate.

**AO: Moving on to questions outside BRAQCON; CIBA had carried out several demonstrations in farmers' ponds reintroducing the Indian White Shrimp, *Penaeus indicus*, which was already a farmed species earlier. What were the objectives and the broad outcome from these demonstrations?**

**Dr. KKV:** You must surely know that India actually

started shrimp farming with indicus, our native species. Indian white is a brand in the international market. Subsequently, a successful business model was developed for black tiger when MPEDA introduced consultants like Aquatic Farms to scale up shrimp farming in the country. We should actually have continued to farm indicus along with scaling up of tiger but did not do so and then Black tiger became a success story all across the country. Presently vannamei dominates in the Indian shrimp farming scenario contributing close to 90% of India's production.

At CIBA, we felt that it was very risky for a Rs. 30000 crore industry to depend on a single species, that too an exotic variety whose broodstock is continuously imported to sustain the industry. What would be the scenario if by any disease/trade reason; we don't get the broodstock from them? As a research institution, it is our job to think about the future. And for the sustainability of the sector in the future, we felt that a multi species shrimp farming model where we have both indicus and tiger shrimp, apart from vannamei would be more sustainable. All species have their own advantages. Vannamei has been most successful because it has an open thelycum, can breed easily and attains maturity early. However, it would be dangerous if we totally neglect the native species.

So it was with this view and in order to bring back the confidence of the farming community on farming other species we decided to carry out field demonstrations with indicus. We have used only fully screened stocks for seed production so that there are no issues in farming. Our objective was to show the farming community that farming of species like indicus too can bring in good crops and profits and we were successful in showing that.

The trials mentioned above were carried out under a limited budget provided under an NFDB project. Screening was totally done by CIBA. It was very expensive as most of the stocks were positive for WSSV. Further, since CIBA only has an experimental hatchery, we wanted a hatchery operator to produce indicus seed for us. Initially no one was ready and finally one Mr. Suresh Nayak agreed. During the indicus trials, the growth of non-selective bred indicus attained growth of upto 18-20g on par with the growth of selectively bred

vannamei in the same duration of time. Subsequently vannamei grows much faster. During our trials, we even developed a feed for indicus. The protein requirement is between that of vannamei and black tiger. While vannamei requires a protein content of 32-34 % and tiger requires around 40-42%, the indicus needs around 35-36% protein in its feed.

**AO: What is the path forward now? Is CIBA initiating any programme on the selective breeding of the species? What is the status of the programme? Has the Government or NFDB sanctioned funds? Does CIBA have a site to develop the programme? Would CIBA be partnering with any private entrepreneur in the programme?**

**Dr. KKV:** Indicus is a species that is very much suitable for selective breeding. Stocks are available all along the Indian coast. We had carried out trials with stocks from different regions and found that the stocks from Karwar, Kollam, Kanyakumari and Mahabalipuram grow much faster than stocks from other regions.

I have been flagging the need for a selective breeding programme for indicus with the DADF ever since I joined CIBA as the Director. Everybody agreed on the requirement but then, you know that selective breeding programmes require a funding of at least Rs. 200 crores to begin with because it is a minimum 5-7 year program and will need to be continued beyond that. We will require an NBC for this program and multiple back up facilities established in different geographic areas for the replenishment of stocks in the event of any damage to the main facility due to natural calamities like cyclones.

**I am of the view that the Selective Breeding Programme should be implemented on a consortium mode.** The partners should include the State Govt. that provides the land, the Central Govt. for approvals and policy support, NFDB for funding, MPEDA for monitoring and a couple of corporate entities that will actually operate the facility. We could also have an international partner/consultant such as the Oceanic Institute, Shrimp Genetics or scientists



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like Dr. Wyban who has experience in implementing such programmes. CIBA will provide the technical expertise and R & D support for this program, and play a facilitator role. We have to understand that selective breeding of aquatic species is tough and we should be realistic in our approach as we cannot repeat the whole thing if we get something wrong. So it is essential that the project has a very strong team.

The government should also understand that Selective Breeding is an expensive programme and investing Rs. 200 crores for sustaining a Rs. 30000 crore would amount to nothing. It is high time that we have such programmes. If the money is provided, I think CIBA and the stakeholders together can do it.

### **AO: CIBA are the pioneers in Seabass breeding and seed production in India. What is the present status of this programme?**

**Dr. KKV:** CIBA had the technology for breeding Seabass in the year 2000 itself. We had also transferred the technology to RGCA. Now CIBA and RGCA both have this programme and together produce over 3-5 million seeds per annum. We are in the year 2018 now and yet to see a single hatchery in the private sector operating. This is basically because farming shrimp is presently a very successful model, and owing to its ease in farming, it has become difficult to introduce any other species to compete with this system.

We have been campaigning aggressively since the last few years as we feel that finfish aquaculture also has to be promoted for sustaining the sector. Along with the hatcheries, nursery and farming systems also have to be developed simultaneously in the form of a three tier system. The nursery phase, where hatchery produced fry are to be reared to around 20 g size is very crucial for the success of Seabass farming. Hatcheries can also come up, but will have to be dependent on a mother hatchery such as that of CIBA or RGCA for supply of spawn or just hatched fry as broodstock maintenance and breeding is a costly affair.

Over the years CIBA has successfully demonstrated Seabass farming in several areas and different systems. The success of the Cage farming demonstration carried

out with NIOT in the Marakkanam estuary where we could produce 15-20 kg of fish/m<sup>3</sup> in 7 or 8 months is noteworthy. Most of these demonstrations were carried out with the involvement of the local fisherfolk and farmers. However farmers are still hesitant to come forward for farming Seabass because of the ease in farming and high profitability in shrimp.

CIBA has also made headway in the development of larval, nursery and grow-out feeds for Seabass which are on par with imported feeds on performance but much more cost effective. Availability and affordability is essential when the industry is in the nascent stage. Recently, two entrepreneurs; one from Marakkanam and the other from Nellore have come forward and signed MOU with us for technical assistance establishing Seabass hatcheries. It would be good if organisations like NFDB come forward and support these interested entrepreneurs.

### **AO: CIBA has also made breakthroughs in Milkfish breeding and farming. Has there been any seed supply or attempts at commercialization of Milkfish technology? Are any hatchery/farming packages available to the entrepreneur?**

**Dr. KKV:** Chanos is a fish that perfectly fits into the bill of a fish for the common man in the domestic markets that is available at a price of Rs. 150-200/Kg while most of the sea fish today is sold in the range of Rs. 300-700/Kg. One Mr. Arun Padiyar had associated with us for Milkfish breeding after carrying out a market survey of this fish of 200-250g size in different markets in South India. The acceptance was very good as the numerous bones, normally associated with this fish were soft and people did not have any issues consuming them. This was in contrast to the results of a survey carried out by me during the early part of my career where Chanos measuring 500g to 1 kg were quite unpopular because of the bones. Now that we now have a hatchery technology for Chanos, this fish too offers potential for farming. We had provided hatchery produced Chanos seeds to a farmer at Kollam in Kerala who did monoculture in an

earthen pond and harvested 200g-600g sized fish in 6-7 months culture period. It was a pucca commercial model as he used a low protein feed called Polyplus developed specifically for Chanos by CIBA, costing around Rs. 35/Kg. I think he harvested around 2-3 tons of Chanos and sold them at a rate of Rs. 350/Kg whereas his production cost was only around Rs. 90/Kg.

This fish is also suitable for polyculture with shrimp as some of our trials have indicated that these do not consume much shrimp feed and the gut content analysis mostly indicated consumption of algae, allaying the fears of farmers that they consume feed. Chanos is mostly a natural feeder and it consumes only small quantities of supplementary feeding. Chanos can also be kept in a pen within a shrimp pond if the farmer fears that they eat too much of shrimp feed broadcast into the ponds. Chanos ponds can ideally be used for shrimp for the subsequent crop which is known to yield excellent performance. The water quality in such polyculture ponds are known to be very good as Chanos eats up all the excess algae produced in the system. Chanos like Seabass and Mullet is also euryhaline and can adapt to freshwater and sea salinity. Presently, CIBA is doing seed production of Chanos consistently and we can produce quite some quantity of seed depending on requirement as the fecundity of this fish is very high.

Just recently a shrimp hatchery owner in West Bengal has come forward seeking our assistance in establishing a milk fish hatchery there. A Rs. 3 Crore multispecies hatchery is also coming up in Maharashtra being developed by the Mangrove cell. While RGCA is supporting the development of Mud Crab hatchery, CMFRI is providing the technology for a molluscan hatchery and CIBA to establish and operate a seabass hatchery. So the scenario for the future seems to be improving. We are also seriously thinking about breeding Red snapper and working on the development of saline tolerant tilapia.

**AO: CIBA is also known to have achieved breakthroughs in breeding of Pearl Spot and a few other marine/brackishwater ornamentals. Have there been any attempts to**

## **commercialize these technologies sir? What is the response from the industry so far?**

**Dr. KKV:** Yes, we have made a major breakthrough in *Etroplus* breeding. Though several people had been trying to breed the fish over the years, they had met with limited success as they were trying to breed them in breeding ponds. *Etroplus* establish mating pairs and during the mating period and are usually very aggressive towards during this period. They also exhibit parental care of their offspring till they reach sizes of 2-3 grams. During this period, there is usually no further mating and production of offspring. The CIBA technology had a modular system where mating pairs are maintained in separate tanks supported with a recirculation system. Once the spawning is completed, the eggs are removed, hatched and reared in separate tanks. This would allow the fish to breed more frequently. In this way, we get a cycle, every 45 days with about 500-900 fry from each cycle. If we can have several pairs maintained separately in a hatchery, any number of seed could be produced. This modular system is very cost effective and can be done by any household. Yes, there are some enquiries for seed production technology and you could see emergence of commercial hatcheries soon as this fish is extremely popular in Kerala. We are also planning on a Selective breeding programme of this species with assistance from the Govt. of Kerala.

With regard to marine ornamentals, presently, we do not have any models in India for propagating ornamental fish culture. It is usually caught from the wild and marketed. CIBA has made progress in 4 species in terms of hatchery, breeding and feed; the Spotted scat (*Scatophagus argus*), Crescent bass (*Therapon jarbua*), Moon angel (*Monodactylus argenteus*) besides *Etroplus*. *Etroplus* is also an ornamental fish. Sri Lanka is one country which produces and exports *Etroplus maculatus* as an ornamental fish in large quantities. We will be displaying all these in aquaria during the BRAQCON event.

**AO: Shrimp Aquaculture in India has progressed leaps and bounds**

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## **in a short period of time since the introduction of vannamei. Do you think that this is a sustainable practise for the country on a long term?**

**Dr. KKV:** For any sector to be sustainable, it should be inclusive. And with India's population set to touch 1.6 billion by 2050 we cannot look to agriculture alone to meet our nutritional demands. The growth in the agricultural sector is less than 3% in the last 5 years while the aquaculture sector is growing at 10-14%. Further, vast potential exists for further expansion of aquaculture in the coming years. However, to sustain aquaculture practices, we require more species diversity and not promoting the farming of shrimp alone, even though we understand that Shrimp farming is the economic engine of Indian Aquaculture. A diversified farming model is most essential for long term sustainability.

At CIBA we strive to promote technologies and practices that are techno-economically viable and environmentally and socially sustainable for food, employment and prosperity. This would be a sustainable model for the future.

## **AO: What do you feel would be the next species (either fish/shrimp) that would make an impact in the aquaculture sector?**

**Dr. KKV:** I think it would definitely be tilapia and a herbivorous fish such as milkfish. Tilapia and Milkfish are popular all over the world and I am sure that farming of this variety would ultimately catch up in India too. Farming saline tolerant varieties of Tilapia is another futuristic option. I see immense potential for large scale production and export of this fish from India.

## **AO: Off late, quite a few feed mills have used CIBA feed mill technology for their projects. What is the reason for this? What kind of assistance does CIBA offer in this regard?**

**Dr. KKV:** In the year 2009 when vannamei was introduced for commercial farming in India, the feed cost was between Rs. 50 – Rs. 60 per Kg. The cost had escalated to around Rs. 70 to Rs. 80 per Kg by the year 2014 when I joined as the Director of CIBA. I found that several farmers were struggling to come to terms with the sudden rise in feed costs which was badly hitting their profits. Several of the larger farmers were keen to establish small plants to cater to their own requirements. When some such farmers approached us for technology, our nutrition department started working on feed formulations and found that high performance shrimp feed could be formulated at very reasonable costs (around Rs. 49/Kg at that time).

We conducted field trials comparing our feed with several commercial feeds at our Kakdwip centre and found that the results were almost identical. Subsequently, one farmer in Gujarat had agreed to conduct a comparative study of our feed with the regular commercial feed that he used for a complete commercial crop. We provided him the feed at our production cost with additional charges for transport. In this trial, our feed performed better than the commercial feed that he was using and he was absolutely satisfied with the performance. Sai Aqua feeds at Bapatla promoted by Mr. Karunaraju and his partners were the first to avail our assistance and technology. He was very supportive in several areas during its establishment and even provided us the assistance of a mechanical engineer when we had some issues with the boiler. He has informed me that he has already recovered the investment that he made for establishing the plant in two years. Then there was the Haryana entrepreneur and subsequently a few more. More and more big farmers are coming into the fold now. This model will be a supplemental one which mainly caters to the needs of medium scale farmers or farmer clusters, in the 0.7 million shrimp feeds sector of India.

## **AO: Emergence of New diseases in Shrimp aquaculture is a matter of great concern for the Shrimp farming sector now. Apart from losses due to white spot disease outbreaks, losses of unimaginable magnitude is also**

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## **caused due to diseases like White Guts and White faeces syndrome and Running mortality and vibrio outbreaks. Does CIBA have any guidelines or advisory for the sector to prevent or deal with such diseases?**

**Dr. KKV:** Yes, we understand the present situation. We have been closely studying the health of the sector over the years. CIBA has one of the strongest scientific team in health & disease. Right from the period when vannamei was introduced for commercial farming in India with a major push from CIBA, we have constantly been monitoring vannamei farming and the problems associated with the farming systems. We are also the institution that has been pursuing its research on EHP right from the period it was reported in India. Today we have developed a Real Time PCR kit for EHP, which is under evaluation.

Our experience and expertise show that in the present situation, most of the new diseases such as white guts and white faeces are more due to deficiencies in the farming system than caused by pathogens. Of course, these could be related to EHP too. But generally it is related to intensification of the systems, effect of abiotic factors such as temperatures, unhealthy/unscientific feeding practices, inadequate health system due to lack of pond preparations etc. All these are acute stressors to the shrimp and affect the health of the hepatopancreas which is the powerhouse or engine of the shrimp. During such stress, the shrimp do not digest or assimilate the feed consumed which just goes out as faecal matter. The build-up of this waste in the ponds often leads to White faeces and RMS. If the pond conditions are improved, the aggravation of such issues could be arrested. Our research outcome has been brought out in the Journal "Aquaculture".

Another disturbing aspect in present day shrimp farming is the unrestricted use of several unnecessary inputs in farming which has become a fashion. Minerals are dumped into the ponds in huge quantities without studying its requirement. Industry is driven by products and product technicians. They are essential for the sector too and should have the right exposure and information. We have an FAQ book (with 101 questions

on shrimp farming), and a mobile app which we intend to link with the technicians and farmers so that they get the right information.

I would like to say that intensification without adequate infrastructure will bring in new disease; change in climate/unfavourable climate will also bring in diseases. We should be responsible and practise scientific and sustainable farming practices if we have to avoid them. Unrestricted use of many unnecessary inputs is also a serious stress factor. It will become a knowledge driven farming, with better management practices (BMPs) in the coming years.

## **AO: Does CIBA provide any support/plans to the sector for disease diagnosis or screening by establishing labs in major farming hubs of India or training of manpower in the same?**

**Dr. KKV:** Certainly. CIBA has been extending its expertise in the establishment of disease diagnostic laboratories. In the model that we have now, we partner the organization/entrepreneur that comes forward, provide technology assistance in the establishment of disease diagnostic labs, train their people in operating the lab. We can also provide them test kits whenever required. This is what we did in Corporate Social Responsibility (CSR) programme. The KCT group spend 50 lakhs for establishing a state-of-the-art lab in Nellore alone with CIBA as the knowledge partner. Subsequently, they have set up another one at Bhimavaram and one more is coming up at Surat in Gujarat. It would be good to have Private Public Partnership (PPP) models where organisations like NFDB can come together with the state government, CIBA and private players can come together with CIBA providing them the technology and the training.

In a recent skill test conducted by us for PCR labs, the participation from the sector was low as it was not mandatory. However, many of the ones who did participate also failed, because they do not have the skill. Key decisions on seed quality are dependent on their diagnosis and therefore they have to be trained adequately. CIBA is also working on three programmes in health; the first one is disease surveillance, the second on network programme on animal health and

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the third one on vaccine and diagnostics. Antibiotic residue programme is most important. We initially had signed a MoU with the Sea Food Exporters Association to profile the antibiotic issue, but it did not progress as expected.

**AO: We see a lot of potential for polyculture of Shrimp with Tilapia in the sector especially for the extensive and semi-intensive farms. Lack of Tilapia breeds and salt tolerant Monosex tilapia seeds that survive and grow well in brackish water is an issue here. Does CIBA have any plan in this regard?**

**Dr. KKV:** We should promote polyculture because it is a sustainable model. We already have the technology for breeding Chanos, a species ideal for polyculture. Red Tilapia and Saline Tolerant Tilapia should also definitely come, though marketing of Tilapia is still a big issue in India. We have to standardize polyculture systems in India combining all shrimp species whether it is Black Tiger, vannamei or indicus with Chanos, Mulletts and even with Etroplus. We should get CAA to approve practising these sustainable models. CIBA can definitely support if the industry comes forward, in terms of supply of fish seed and addressing all biosecurity concerns with respect to disease.

**AO: Do you think that the Industry-Institution collaboration in the country has reached the levels as in the Western countries? What do you think is lacking here? Why don't we see many PPP programmes in the Aquaculture sector in India?**

**Dr. KKV:** Industry-Institutional collaboration is one of the most important prerequisites for the success and sustainability of any sector. We should have an American model where the consortium comprises of farmers, industry people and the institutions. The industry supports the institutions in the research by funding the programmes that are important for the industry. Serious research happens this way. However,

we are yet to reach that level of collaboration in India.

However, recently there is a kind of association happening between the industry and CIBA with some entrepreneurs coming forward and signing MoU's with us for support in establishing feed plants. That is because they are making profits through this association. The sector should not work compartmentally. If we succeed in bringing the industry and institutions together we can be the world leaders and a model for others. You should strengthen the hands of CIBA as this institute belongs to the brackishwater aquaculture sector. In fact, I have often reached out to organizations like SAP (of which I was one of the founder members way back in 2003) because I saw an opportunity to work together.

**AO: One last question sir. What is CIBA's vision for the future sir? What can the commercial Brackishwater Aquaculture sector look to CIBA for in the future?**

**Dr. KKV:** The prospects for brackishwater aquaculture in India are very promising. We are growing. However our approach should not be like a golden goose – A bubble and burst shrimp model. We need diversified species and diversified systems in the aquaculture, rather than single species driven farming. As I mentioned earlier, CIBA would like to promote techno-economically viable, profitable, environmentally and socially sustainable technologies and practices for long term sustainability of the sector. We are indeed lucky that the nation already has the complete system in place – an institution for every need of the sector; be it research & technology, funding, regulation or promotional needs or exports. We just need to function in synergy with the sector, where sharing of strength and weakness need to be in place.

CIBA is an organization for the sector. We are always ready to hold hands with the sector, government, public sector or private sector for its development and sustainability. My only request is that the industry should come forward to utilize our services and expertise for the betterment of the sector.