



India's Farmed Shrimp Sector in 2020: A White Paper

By

The Society of Aquaculture Professionals

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Summary

Society of Aquaculture Professionals (SAP) recently concluded a review of shrimp farming in India in 2020. In a series of virtual meetings held among industry stakeholders on January 29-30, 2021, the unanimous opinion was that farmed shrimp production declined from a record production of nearly 800,000 tonnes in 2019 to about 650,000 tonnes in 2020, a 19% drop. Earlier forecasts in meetings organized by SAP in 2020 were nearly 30%, so the actual decline was less than what was predicted. The present review also highlighted that while the coronavirus pandemic and related lockdown contributed to the decline, continuing production challenges due to a host of disease problems impacted the production quite significantly. Action by the stakeholders and the government is needed to address the challenges for the sustainable growth of the sector in the future. Following are needed if India needs to grow to the targeted production of 1.4 million tonnes by 2024:

- ❖ Resolve shrimp health issues on a priority basis:
 - Continue to fund, strengthen and make relevant and accountable the national aquatic animal disease surveillance with an exclusive focus on shrimp
 - Undertake epidemiological and other studies to understand the extent and underlying cause of white fecal disease, running mortality syndrome and other emerging diseases in shrimp farming and development treatments for the diseases
- ❖ Increase carrying capacity of the ecosystems that support shrimp production:
 - Educate farmers about the best aquaculture practices that enhance carrying capacity of their production systems and minimize organic loading of the ecosystem that supplies their water
 - Dredge the creeks supplying water for the farms and keep the bar mouth open for tidal action that improves water quality along the creeks
- ❖ Expand and diversify the markets:
 - Develop or participate in a global program to promote shrimp consumption in the major markets, especially USA, where consumption has remained stagnant while global production of farmed shrimp keeps increasing
 - Regain markets in Europe, Japan, and other countries
 - Invest in the Made in India shrimp branding
 - Develop the domestic market for shrimp in India

Farmed Shrimp Production in Major Regions

Drawing the knowledge of SAP's members who live in major shrimp farming regions of the country, the organization estimated regional production figures which are as following:

Region	Estimated Production in 2020 (Tonnes)
West Bengal	50,000
Odisha	55,000
Northern Andhra Pradesh (Srikakulam to East Godavari districts)	126,000
West Godavari	135,000
Krishna	70,000
Southern Andhra Pradesh (Guntur to Nellore districts)	106,400
Tamil Nadu	21,000
Gujarat	23,400
Other States*	7,000
Unaccounted**	56,125
Total	650,000

* The states of Kerala, Karnataka, Goa, Maharashtra, Punjab, Haryana and Rajasthan. Specific reviews of farmed shrimp production in 2020 in these states were not conducted in 2021. Instead production estimates for 2019 were used to arrive at the 2020 figures.

** SAP estimates from the export figures published by the Government that the total farmed production would have been between 630,000 to 670,000 tonnes. The large variance is due to the uncertainty in production that reaches domestic markets. The average figure of 650,000 tonnes is taken as a reasonable estimate of national production in 2020 and the difference between what was estimated for all production regions and 650,000 tonnes is presented as the unaccounted figure.

Presenting information from the states of West Bengal and Odisha, Mr Shrinibas Mohanty of Avanti Feeds estimated that the two states registered a decline of 15-20%, and West Bengal was more impacted than Odisha. Whereas stocking in these states normally commenced in mid-February and continued on till the end of April, reduced seed availability during the lockdown meant that major stocking happened during the May-June period in 2020. The incidence of the White Spot Syndrome Virus (WSSV) was higher and more severe, and there

was a high incidence of the Running Mortality Syndrome (RMS) in the second half of the year resulting in lower production.

In the Northern Andhra Pradesh districts ranging from Srikakulam to East Godavari, farmed shrimp production declined by about 16% in 2020 according to Mr V. Punnaivanam of The Waterbase Limited. Panic harvesting during the early stages of lockdown and subsequent disruptions accounted for most of the production loss. The region actually performed better in the last six months of 2020 when compared to the first months of the year and the last six months of 2019. However, *Enterocytozoon hepatopenaei* (EHP), the microsporidian that causes stunted growth, was spreading in the mostly low saline areas of the region. But, farmers investing in infrastructure for improved biosecurity were seeing good results in the control of EHP as well as White Feces Disease (WFD) even in seawater farms. Farmers were anyway switching to shorter and more frequent crops. Combined with controlled feeding this practice reduced the Feed Conversion Ratio (FCR), and production costs.

In West Godavari, the district of Andhra Pradesh that produces more shrimp than any other district and more than even entire states outside of AP, saw about 20% drop in production in 2020. In the adjoining district of Krishna which also produces large quantities of shrimp, the drop is estimated to be about 10%. As per Mr Bangaru Ravikumar of Growel Feeds who presented the data from these two districts, arriving at precise production estimates in both districts is challenging due to the prevalent practice of polyculture of shrimp with fish in low salinity waters. While the pandemic-related lockdown was partly to blame for the production losses, weather-related events, particularly the premature drop in temperature in the last six months of the year and associated increases in the incidence of WSSV and decreased growth contributed to the decline. However, persistence of EHP and WFD in the two districts was more a concern than WSSV. While the problems were less in low salinity waters, the practice of many farmers to attempt multiple crops without draining the water and drying the pond bottom in between the crops was leading to production challenges.

Mr A. Kumaresan of Sheng Long Bio-tech India Pvt. Ltd. reported that the southern districts of AP which had seen lack of rains for a number of past years and resulting decline in the quality of water in creeks and borewells experienced good rainfall in 2020. The overall production from the region increased due to this reason, although premature harvest prior to the cyclone Nivar, damage to some farms due to the cyclone, and the high incidence of WSSV post-cyclone reduced production to some extent in the second crop.

Reporting on the state of Tamil Nadu, Mr Kumaresan said that the state saw about 17% increase in the farmed production of shrimp in 2020 which was attributed to sufficient rains in the state. With only about 2700 hectares in production, higher than national average in stocking density where 41-60% of the farms stocked at 40-60 shrimp/sq.m., and lower disease incidences, the state recorded a high productivity close to four tonnes per hectare per cycle.

Mr Jignesh Contractor of Vaishnavi Aquatech presented data from Gujarat, the only major shrimp farming state in the west coast of India which has seen dwindling fortunes in shrimp

farming in the past few years. From its peak of nearly 50,000 tonnes in 2017, the state has dropped to nearly 23,000 tonnes in 2020 causing a grave concern. Due to cooler weather, rains in the middle of the growing season, the state mostly raises only one crop a year. Its dependence on seed supplies from hatcheries on the East Coast and shortage of migrant labour during the pandemic caused part of the production decline. Continuing production challenges due to the rapid expansion of farming in the past decade caused the other part of the decline. Many farmers practiced nurseries and some of them were highly successful. Introduction of disease resistant lines of shrimp in 2020 resulted in the management of crops amidst diseases in the state. Black tiger shrimp due to its ability to grow fast to reach a large size was always favored in the state due to the crop in Gujarat being restricted to a single crop a year. The availability of Specific Pathogen Free black tiger shrimp in 2021 would result in large scale trials with the shrimp, but farmers would still prefer to go for shorter crops of 110-120 days to minimize their risk, Mr Contractor predicted.

Production Factors in 2020

A survey of the regional trends in production factors among the contributors of the 2020 review revealed the following:

- Stocking densities in most regions are primarily in the 20-40 shrimp/sq.m. range. Only in the southern districts of AP and in the states of West Bengal and Tamil Nadu, stocking densities of 41-60 shrimp/sq.m. occur as widely or in greater proportion than 20-40 shrimp/sq.m.
- Length of crops have shortened to 110 days and even 90 days in most production regions. Wherever it is feasible, farmers go for three crops a year and even four crops.
- Most of India produced shrimp in the size range of 10-16 g (61-100 count) while the states of West Bengal and Odisha produced primarily 16-25 g shrimp (41-60 count), and Gujarat mostly targeted the production of 25-33 g shrimp (31-40 count).
- All regions reported that Diseases were the Most Challenging aspect of their shrimp production. Less than 25% of the lost production was due to diseases, said respondents from West Bengal, Odisha, southern AP and Tamil Nadu, but respondents from Gujarat, Northern AP, West Godavari and Krishna said that 25-50% of the production losses were due to diseases. WSSV was considered to be most menace by a majority while EHP and WFD were ranked to be # 2 and # 3 concerns by those in Andhra Pradesh, and Tamil Nadu while Running Mortality was ranked to be the # 2 concern in West Bengal and Odisha where EHP was ranked to be the # 4 concern.
- Lockdown and farmgate prices of shrimp were flagged to be the most challenging aspects of production in 2020 by 75% of the respondents.
- Cost of production was considered as a key constraint by 50% of the respondents. Those in West Godavari, southern AP, Tamil Nadu and Gujarat said cost of production was a challenge.
- Availability of credit was identified as a major challenge by respondents from Gujarat, West Bengal, and Odisha.

- The respondents predicted that West Bengal, Odisha, Northern AP, Krishna, Southern AP and Tamil Nadu to produce more shrimp in 2021 when compared to 2020; West Godavari to maintain its shrimp production as in 2020; and Gujarat to register a further decline in 2021.

Sectoral Assessments: 1. Hatcheries

Mr Ravi Kumar Yellanki, the immediate Past President of SAP as well as the Managing Director of one of the largest shrimp larval producers in India (Vaisakhi Bio-marine Pvt. Ltd. & Vaisakhi Bio-resources Pvt. Ltd), presented on the status of the hatchery sector in India in 2020. He said that 500+ shrimp hatcheries in India produced 70 billion PL in 2020 despite the lockdown causing disruptions in the import of broodstock and vital supplies like the bloodworm. About 70 large hatcheries belonging to one of twenty firms in the business accounted for about 57% of the production indicating the degree of consolidation happening in a presently fragmented market. The sector imported 252,000 broodstock in 2020 despite the lockdown stopping imports in April and May, the peak production periods for the hatcheries. Broodstock supplies were dominated by the Shrimp Improvement Systems (150,000 broodstock) and Kona Bay Marine Resources (90,000 broodstock). Due to the reduced shrimp production in 2020, shrimp productivity expressed as tonnes/million PL production fell from 11.18 in 2019 to 9.28 in 2020. The continuing drop in this productivity index is a cause of concern, he warned. In 2021 he expects the hatchery sector to produce about the same quantity of PL as in 2020, the PL prices to be stable but remain low, and performance verdicts to be pronounced on the newly introduced disease tolerant and balanced lines.

Sectoral Assessments: 2. Shrimp Health Management

Some of India's well known shrimp health experts from both public research and private sector participated in the panel discussions on the status of shrimp health in 2020.

Dr Shankar Alavandi of the Central Institute of Brackishwater Aquaculture (CIBA) informed that disease surveillance by CIBA has shown a rise in non-infectious diseases like WFD and RMS in farmed shrimp in 2020 and these diseases previously seasonal now occur throughout the year. The occurrence of Infectious Myonecrosis Virus (IMNV) in a landlocked state like Haryana means that infected post-larvae are entering into the production systems. He said that CIBA has estimated that EHP and WFD cause losses of about Rupees 4000 crores (551 million USD) and 1700 crores (234 million USD), respectively. He expects the second phase of the shrimp disease surveillance to be funded.

Dr A.S. Shahul Hameed of the OIE Reference Lab at the Abdul Hakeem College spoke about a new strain of WSSV discovered in 2015. Genomic analysis of this strain shows large deletions of the typical WSSV genome. The new strain is the smallest of all WSSV strains and appears to be unique to India. It has a short replication time and therefore is highly virulent. Subsequent studies show that this strain has fully replaced the previous strain in India.

Mr D. Ramraj, the President of the All India Shrimp Hatchery Association and a renowned shrimp pathologist from the private sector drew attention to the increasing occurrence of shrimp showing necrotic muscle tissues. He also expressed concern about the emergence of slow growth in many farming areas. He said that diseases are the primary cause of production decline and urged surveillance programs to seek private sector support and in turn support the private sector with their findings. He asked the farmers to go back to the basics like pond preparation. He cautioned against the indiscriminate adoption of the biofloc technology which may actually create the breeding grounds for many pathogens. He asked the government to facilitate SPF polychaete production which would improve biosecurity in hatcheries, and therefore in farms too.

Mr Bangaru Ravikumar of Growel Feeds shared data from the shrimp samples submitted to his company's diagnostic labs and highlighted how the incidence of EHP is rising in the last three years while WSSV has been in retreat in the West Godavari and Krishna districts. He said that in polyculture, shrimp do well when stocked in low densities. But, when stocked at high densities, diseases proliferate.

Dr Patchala Srinivas of Avanti Feeds shared the disease occurrence data from southern AP showing that WFD, EHP, RMS and White Muscle Disease are major reasons for the loss of shrimp in farming. He also noted the increasing occurrence of white muscle disease. Dr Amerneni Ravikumar of Alpha Biologicals mentioned that histopathological analysis of vannamei showing symptoms of loose shel point out that the animals may have the Idiopathic Hyaline Granulomatous Syndrome (IHGS).

The panel recommended the continuation of the national surveillance program on shrimp diseases and include in it stakeholder participation. It also urged the private sector to follow basic principles of biosecurity and Good Farming practices.

Sectoral Assessments: 3. Shrimp Processing & Exports

In a panel discussion participated by Mr Anil Kumar, the Joint Director of the Marine Products Export Development Authority (MPEDA), Mr Elias Sait, the Secretary General of the Seafood Exporters Association of India (SEAI), Mr Nitin Awasthi of East India Securities, Mr Abdul Razzak Ganj of Liberty Seafoods, Mr Pawan Kumar Gunturu of Sprint Exports, and Mr Ravi Kumar Yellanki, the Immediate Past President of SAP, and moderated by the Founder President of SAP Mr S. Santhanakrishnan, concerns related to the competitiveness of India's shrimp exports were addressed.

Mr Nitin Awasthi highlighted the overdependence on the US market by India and that the US market itself has not grown much. Ecuador, losing the penetration of its favorite market, China, now directs its products to the US. India's cost of production is expected to rise in the face of rising cost of feed ingredients. Government's export incentive policy has been changed and there was an apparent lack of clarity that was detrimental to investments in the export-oriented business in the short term.

Mr Elias Sait expressed that he was optimistic on the outlook for India's export market. Admitting that 2020 has seen fallen production and the export sector had to tackle several challenges such as migrant labor crisis, shortages in the availability of containers, and reduced access to the China market due to the pandemic and lockdown, he expressed supreme confidence on the enterprising nature of India's farmers to keep the cost of production under control. He said that the alternative to the export incentive scheme looks equally attractive and exhorted the stakeholders and the Government to come up with a plan to support achieving the target of 1.5 million tonnes of farmed shrimp production and total marine product export revenue of 15 billion USD (approximately 108,000 crore rupees) by 2025.

Mr Ravi Kumar Yellanki opined that Ecuador is not well placed to supply the US market because the country's high labor cost does not allow it to cost effectively do value addition. Mr Pawan Kumar Gunturu endorsed the view saying that shrimp prices in Ecuador have fallen. Once Ecuador is able to access the China market, the country will redirect from the US to the China market. He predicted a V shaped recovery of the markets and things beginning to normalize in the middle of 2021.

Mr. Anil Kumar said that the recent inclusion of seafood in the US dietary guidelines is a positive step towards increasing seafood consumption in the USA and Indian shrimp exports can definitely gain from this development. The MPEDA is implementing National Residue Control Programme (NRCP) and under the NRCP antibiotic residues in over 7,000 samples collected across the farmed shrimp value chain from hatchery, farm, feed and processing units are monitored. MPEDA has found good progress in the reduction of antibiotic residues in farmed shrimp in the last three years. There is a decline in rejection due to antibiotic residue in shrimp exported to the EU. The rejections have come down to just four shipments from the high of 13 shipments in 2018 and there have been no rejection during the last 6 months. Recently Japan has removed the antibiotic testing for export of Black Tiger shrimp from India which is a positive development. However the requirement of many markets for frozen shrimp to be free of WSSV and other OIE listed diseases is emerging as a new market access challenge. Continuation of the National Surveillance Programme for Aquatic Animal Diseases (NSPAAD) and identification of disease free zones in the future will be crucial for the sustainable growth of shrimp farming in the future.

Priority Actions Needed for Sustainable Growth of Farmed Shrimp in India

1. Resolve shrimp health issues on a priority basis:

The stakeholders unanimously agree that shrimp health issues are the most challenging to manage in shrimp farming. Productivity of shrimp farming has fallen precipitously due to diseases until Specific Pathogen Free vannamei shrimp were introduced in India. After nearly a decade of the introduction, productivity is again falling for the past few years due to diseases. Without proper control, diseases will derail the progress in shrimp production. It is in this

background that a focused disease surveillance becomes critical for the sustenance of the shrimp sector.

The Government of India had put in place the National Surveillance Program for Aquatic Animal Diseases (NSPAAD) with substantial financial support but this program was broad-based covering all aquatic animals and involving about 25 institutions. Unfortunately, NSPAAD has not given substantive outputs for the benefit of the shrimp sector which is the most important aquaculture sector in the country.

SAP recommends that the future surveillance programs should be centred around the following:

- ❖ Have a separate and exclusive surveillance program for shrimp diseases
- ❖ Limit the number of institutions for the surveillance: perhaps one nodal institute with 4-5 supporting institutions
- ❖ SAP with its 500+ member base and most members being professionals in the private sector offers itself as the industry's strategic partner for real time disease information and sample collection
- ❖ Channel the financial resources to sample collection and diagnosis rather than replicating infrastructure available in the institutions as India has a multitude of diagnostic facilities in both the Government and the Private sector
- ❖ The Shrimp disease surveillance program should have an association with a network of leading disease research labs abroad to share and benefit from their expertise (That in 40 years of Shrimp farming, no new diseases have ever been reported from India points to the fact that there is a gap in the diagnosis of emerging and new diseases)
- ❖ The Surveillance program should come out with models of disease outbreaks and and directives on crop planning to mitigate diseases.

Additionally, research institutions are urged to take up epidemiological studies and other field studies to understand the extent, patterns, cofactors and underlying causes of white fecal disease, running mortality syndrome and other emerging diseases in India. If these diseases are caused by a pathogen, diagnostic methods need to be developed. Treatments and control measures for the diseases should also be developed based on research.

2. Increase carrying capacity of the ecosystems that support shrimp production:

Data from India and other major shrimp producing countries of the world have established that shrimp farming is limited by the capacity of the ponds' as well as the surrounding environment to maintain water and soil quality to sustain production. When the environment is polluted, shrimp farming is greatly affected. A pond ecosystem has a defined capacity in terms of how many animals it can hold at a maximum. A creek ecosystem has a defined capacity in terms of how many hectares of ponds it can host at a maximum. This carrying capacity can be increased by technology, for example, by installation of aerators to increase oxygen content in pond water or by remediation of wastes in the pond.

SAP recommends that the following steps are taken to address carrying capacity concerns in shrimp farming:

- ❖ Farmers need to be educated about and trained on the principles of carrying capacity of not only their ponds but the ecosystem from which their resources, most importantly water, are drawn. These principles are already incorporated in the best aquaculture practices recommended by national and international agencies and certification programs. SAP will strive to reach out to the farmers on the importance of understanding and applying the best aquaculture practices in their operations while it requests other stakeholder organizations, commercial and government institutions to emphasize the same in their farmer outreach programs.
- ❖ We would like the state and central government agencies to undertake activities such as dredging the creeks that supply water to the farms and keeping the bar mouth open for tidal action that improves water quality along the creeks. Funds from the Centrally Sponsored Schemes of the Pradhan Mantri Matsya Sampada Yojana may be directed towards this purpose. Additionally, the beneficiary-oriented schemes of PMMSY and the Fisheries Infrastructure Development Fund should be allocated for farmers who want to upgrade their farm infrastructure for the purpose of enhancing the carrying capacity of the farms.

3. Expand and diversify the markets:

The coronavirus pandemic saw global seafood production and demand being impacted in an unprecedented manner. Though the prices of shrimp plunged in the early days of the lockdown, they resumed to reasonable levels later. But, market volatility and uncertainty continue to influence prices as global shrimp production has more or less remained steady. Expansion of the market is required for further growth of the farmed shrimp sector in India. SAP recommends the following actions:

- ❖ India's shrimp is highly dependent on the USA market which has remained stagnant. So, India has to either develop on its own program or participate in a global program to promote shrimp consumption in the major markets, especially the USA. Global Aquaculture Alliance (GAA), an international body that promotes sustainable aquaculture, has put forward the idea of collective promotion of shrimp in the USA market by major producers by using a model used successfully by the avocado fruit producers in the market. SAP urges the government to study GAA's proposal and decide whether it wants to support the proposal or develop an alternative plan.
- ❖ Support efforts to regain markets in Europe, Japan, and other countries
- ❖ Invest in a Made in India shrimp branding that can distinguish our shrimp in a global market
- ❖ Develop the domestic market for shrimp in India. With a large population and increasing economic prosperity, shrimp is a tasty, healthy, and easy-to-prepare food that will win wide consumer acceptance provided there is adequate promotion and accessibility to the products in the marketplace. A national plan for promoting shrimp consumption and ensuring logistics for the supply is needed now.

Conclusions

Farmed shrimp production in 2020 declined by about 19% to reach an estimated level of 650,000 tonnes. Covid-19 pandemic and the lockdown of 2020 had an immediate as well as lasting negative impact on shrimp farming, processing and exports. However, production losses due to diseases continue to mount and require urgent attention. While farmers are adapting measures such as short crop cycles, nurseries and the use of functional feeds to counter the problems, much productivity loss can be averted if diseases are managed well. National level surveillance of shrimp diseases needs to continue but with greater focus and accountability. Producers need to follow the principles of sustainable farming, especially in the areas of pond preparation, on-farm biosecurity measures, seed selection, stocking and farm management. At a higher level, understanding the carrying capacity of the ecosystem that supports the farming as well as the individual farming units themselves is of utmost importance. Investments in the improvement of infrastructure to support the farming intensity, and choice of the right genetics for the production systems would be critical to success in challenging times. Aquaculture professionals will need to familiarize themselves with the science and practices behind these requirements and carry the messages to other stakeholders in an effective manner. Sectorally, India has some of the best-in-class infrastructure for seed production, feeds and seafood processing. Progress has been made in lowering antibiotic residues in shrimp and value addition at considerable cost efficiency. Excessive reliance on the US market for frozen shrimp is a cause of concern and market expansion and diversification, including investment in a global campaign to promote shrimp consumption and the development of a domestic market, are needed to reach the targets of 1.5 million tonnes of farmed shrimp and a total marine product export revenues of about 15 billion USD (approximately 108,000 crore Indian Rupees) by 2025.

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