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Studies on present problems and prospects of shrimp farming in west Godavari district of Andhra Pradesh, India

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ABSTRACT

The commercial shrimp culture was introduced in late 1990s and reaching a peak in 1994 and thereafter it was suddenly declined in the Andhra Pradesh. The series of white spot disease outbreaks, lack of quality seed and feed, problems in quality brood stock, increased cost of production on account of feed, labour and the mandatory certificates requirements are suggested to be some of the important factors leading to the production decline. While majority of the output comes from Andhra Pradesh, particularly the East Godavari West Godavari, Krishna and Nellore districts. The present work was carried out on data collected from 228 shrimp farms along with farmers in different mandals of West Godavari district. The present trends indicate that the sector is set to revival, but the future prospectus of shrimp farming will also depend on the sustenance of white leg shrimp Litopenaeus vannamei that was introduced recently in India. Although it provided a hope and opportunity for sustainable shrimp farming, some diseases are already reported. The main problems and constraints expressed by the farmers are discussed according to the severity in the farming practices in shrimp culture. Availability of healthy and disease free seed is a major problem for them. The possible suggestions are identified by the shrimp farmers are also discussed.

Keywords: Shrimp culture, West Godavari, Different Problems, Suggestions, Prospects.

INTRODUCTION

Shrimp farming has grown a traditional, small-scale business in Southeast Asia into a global industry (Joseph Selvin *et. al*, 2009). In India extensive production systems of shrimp culture is more profitable (Leung & Engle 2006) than the other culture systems. Technological advances have led to growing shrimp at even higher densities. Almost all the farmed shrimp are penaeid group of the family Penaeidae and only two shrimp species tiger shrimp *Penaeus monodon* and Pacific white shrimp *Litopennaneus vannamei* occupied more than 90% of the farmed shrimp production. Krishnan and Birthal (2002) have also explained that due to the demand and growth of coastal aqua culture in India, it also has been quite a promising sector for accelerating the exports and improving the foreign exchange. The shrimp has been introduced and farmed in Asia since the mid 1990s, (Balakrishnan *et al*, 2011). Development of shrimp farming is an important activity in coastal waters of Andhra Pradesh in India. The shrimp production has grown at phenomenal rate during the year 1992-1994 and later started decreasing due to outbreak of diseases. The rapid growth of shrimp farming led to an economic boom but, the out break of viral diseases has increased the economic risks and slowed the industry development (Flegel, 2006). The Marine Products Export Development Authority (MPEDA) in association with Network of Aquaculture Centres for Asia- Pacific (NACA) has started a programme in Mogalthur, West Godavri district in 2002 which helped the farmers to adopt Better Management Practices (BMPs) for disease control and sustainable farming. The programme was successful in organising the small scale farmers into self help groups for adoptions of BMPs. However, the growth of shrimp farming is slow between 1999-2009. During this time, freshwater prawn farming in India developed in 1999 due to sudden surge in demand and in response to the decline in marine shrimp production caused by White Spot Syndrome Virus and the Supreme Court judgement on coastal regulation zones (CRZ) (Mohanakumaran Nair and Salin, 2006). The shrimp farming gained momentum after introduction of *L. vannamei* in 2009. The culture area and

production of *L. vannamei* has been constantly increasing and the details shown in Table-1. In Andhra Pradesh, it increased from 264 hectares of area to 37,560 hectares and the production increased from 1655 tonnes to 2,76,077 tonnes during 2009-10 to 2014-15.

Table -1: The area under culture and production levels of *L. vannamei* in Andhra Pradesh & rest of India (2009 – 2015)

Year	Area under culture in Ha			Year	Production in Tonnes		
	AP	Rest of the India	Total		AP	Rest of the India	Total
2009-10	264	19	283	**2009-10**	1655	76	1731
2010-11	2739	192	2931	**2010-11**	16913	1334	18247
2011-12	7128	709	7837	**2011-12**	75385	5331	80716
2012-13	20198	2518	22716	**2012-13**	133135	14382	147517
2013-14	49764	7503	57267	**2013-14**	210639	39868	250507
2014-15	37560	12680	50240	**2014-15**	276077	77336	353413

(Source: MPEDA, 2015)

Further, Shrimp culture has been listed as one of the priority sectors in India by the Government for increasing exports and thereby contributing to the foreign exchange reserves (Swathi Lekshmi et al., 2013). The shrimp and marine exports from Andhra Pradesh has also been tremendously increased from Rs.2100 crores to Rs.14,200 crores during the same period(MPEDA,2015). The farmers had first bred tiger variety *Penaeus monodon* and then shifted to *Litopenaeus vannamei* and their earnings are increasing. Development of shrimp farming has contributed enormously to the local economy as well as that of the State (Kumaran *et. al.*, 2003). The present study was carried out in West Godavari District of Andhra Pradesh to understand the nature of shrimp practices followed and its socio economic status of local population, the influence of extension support and the constraints if any faced in the culture and wants to highlight the issues and strategies for sustainable shrimp aquaculture.

Study area: West Godavari district lies between 16^{o} 15′ and 17^{o} 30 N and 80^{o} 55′ and 81^{o} 55′ E and has an area of 10,807 sq. km, with a population of 39, 95,742. It is a major rice producing region in the state with 56% of the total area of the district under rice cultivation. Generally, farmers of the district culture both *L. vannamei* and tiger shrimp *Penaeus monodon*, because of its high market value. Out of the 46 mandals of the district, 7 (Narsapur, Mogalthur, Elamanchili, Palakol, Palakoderu, Veeravasaram, and Bhimavaram) mandals were chosen and detailed study was carried out in 36 villages with respect to the culture practices, water, feed and health management followed by the farmers. For the Socio - economic component of the study, data was collected from 228 randomly chosen shrimp farmers using pre-tested questionnaire. Meetings of various stakeholders were held in 10 villages to assess the impacts of shrimp farming in the study area.

MATERIALS AND METHODS

The present study was carried out on a data set of 228 shrimp farms along with farmers. The data was collected from 36 revenue villages spread over in 7 mandals of West Godavari district of Andhra Pradesh. The methodology adopted in the present study differs from the earlier evaluation studies. We have collected data from the clusters formed by the National Centre for Sustainable Aquaculture (NaCSA) for better reliable statistics. As the brackish water culture is mostly in private sector and the culture is a dynamic environment, the actual figures some times vary with the data collected from the respondents.

The sample design of the study: The study was adopted in three stage stratified purpose random sampling. The West Godavari district is divided into four revenue divisions Narsapur, Eluru, Kovvuru, and Jangareddygudem. Coastal mandals from the Narsapur division is only taken as the other three revenue divisions do not have brackish water area. In the first stage, revenue mandals were selected based on the presence of brackish water area and areas of low salinity where shrimp is cultivated. Several authors reported the growth and survival of *L. vannamei* in low salinities of 1.7- 2.3 ppt of brackish water area (Bray *et al.*, 1994; Moya *et al.*,1999;Samocha *et al.*,1999). In the second stage of sample selection, 7 mandals and 36 villages which are having either the pure brackish water area or areas of low saline waters. In the third stage, the selection of the farmers was made, in each selected village the farmers were selected on the basis of their farm registration with Coastal Aquaculture Authority (CAA) of India mainly. Farmers, who applied for registration with CAA having considerable farm area and experience, were also interviewed. The various stakeholders were also interviewed along with farmers.

Surveys and data Collection: The present study made the use of secondary as well as primary data. The primary data was mainly collected from farmers who are doing shrimp culture. The data is also collected from other stakeholders viz. farmers associations members, community leaders, village elders, and non- shrimp farmers, to analyse the present status and problems in shrimp culture. The secondary data on various parameters associated with shrimp aquaculture were collected from district, state and national level agencies, district and field level

governmental officials, non –officials, and NGOs. The methods adopted for this study include pre determined schedule, discussions, surveys, rapid appraisal methods. The brief summary of the impact assessment methods adopted by this study are presented in Table- 2.

Table – 2: Impact assessment methods adopted by the study

S.No.	Description of the Method	Description of the Units Covered
1	**Survey Method**	
	a) Farmers registered with CAA	All farmers in the 36 villages
	b) Sample Survey	Selected shrimp farmers and non farmers or other stakeholders
2	**Rapid Appraisal Method**	
	a) Focus group discussions	Farmers and Non farmers
	b) Semi Structured interview with key stakeholders / informants	1. Various farmers associations members at Village, mandal and state levels 2. Village elders, Community leaders and Knowledgeable persons 3. Government officials 4. Non Governmental Organisations (NGOs)

Sources of the data: The primary data is collected by interviewing the farmers, who are presently doing the culture and also from the farmers who have abandoned the culture recently. The opinions of the stake holders including, feed manufacturers, seed suppliers, hatcheries operators, farm labourers, operators and owners of processing and storage plant units are also taken. Certain information is also gathered from the shrimp exporters. The secondary data is collected from the Department of Fisheries (DoF), Government of Andhra Pradesh, Marine Products Export Development Authority,(MPEDA),Ministry of Commerce and Industry Government of India, National Centre for Sustainable Aquaculture (NaCSA), a society of MPEDA, National Fisheries Development Board (NFDB) Department of Animal Husbandry & Dairying and Fisheries, Ministry of Agriculture, Government of India, Food and Agricultural Organisation (FAO) of United Nations Organisation, Office of the Deputy Director of Fisheries, West Godavari district.

RESULTS AND DISCUSSION

A brief profile of the shrimp farmers of the district is presented in Table-3. It is evident that 54.8% of shrimp farmers had education level of below 10^{th} class (SSC), 41.7% were SSC, 0.9% are Intermediate, 2.2 % are graduate and 0.4% is above graduation level. About more than three fourths of the farmers (92 %) had other occupations (agriculture and business sectors) in addition to shrimp farming and only 8 % have Aquaculture as only occupation. Most of the farmers are small farmers, having a farm size of less than 2 ha (86%) and about 14 % of them were large farmers with more than 2 ha farming area. Most of the farmers had more than five years of farming experience (96.9%). The villagers reported that, the development of shrimp farming helped to increase their income.

Table-3: Profile of the shrimp farmers in West Godavari District

Profile Characteristics	Frequency	Percentage
a) Education		
Below10th Class (SSC)	125	54.8
10^{th} Class (SSC)	95	41.7
Intermediate (10+2)	2	0.9
Graduation	5	2.2
Above Graduation	1	0.4
Total	228	100.0
b) Occupation		
Aquaculture + Other sectors	209	92
Aquaculture only	19	08
Total	228	100.0
c) Farm size		
1= < 2 ha	196	86.0
2= 2-5 ha	32	14.0
d) Experience in culture		
< 5 years	7	3.1
>5 years	221	96.9

Extension Assistance:

More than half of the farmers had regular contact with feed suppliers and extension personnel of the Department of Fisheries (DoF) and other fisheries institutional agencies. The topics of the discussion included issues such as seed quality, disease management and feed management. Their major sources of information related to farming activity were feed technicians, DoF personnel and others. The farmers of 10-15 % only had received training in shrimp farming related areas conducted by State Institute of Fisheries Technology (SIFT), Kakinada and Marine Products Export Development Authority (MPEDA). Most of them wished to have training in disease prevention, seed quality detection, water quality management, application of probiotics and other advances in shrimp farming management practices.

The main sources of the information received in related to shrimp farming by the farmers are given in Table 4. Most of the shrimp farmers (40.35%) indicated that local feed technicians and feed traders were their main source of information related to farming. The Local feed traders, due to their sharing arrangement with shrimp farmers, regularly visited farmers and provided all necessary information. About 28.5% of respondents reported that personnel from the department of fisheries provided them necessary information. 19.74% of farmers indicated that institutional information sources like MPEDA and other fisheries research institutions were their information sources. Private aqua consultants, printed literature like brochures. new letters and leaf lets from feed companies, institutions and meetings, seminars, farmer discussions were the other sources of information.

Table 4: Information sources of the shrimp farmers

S. No	Information Source	Frequency (N=228)	Percentage	Rank
1	Feed Technician	92	40.35	1
2	DoF Personnel	65	28.50	2
3	MPEDA	45	19.74	3
4	Private Aqua consultants	20	8.78	4
5	Other sources	6	2.63	5

Problems and Constraints:

The main constraints expressed by the farmers are ranked according to their severity in Table 5. Viral and bacterial disease outbreaks were considered as the major constraint by 66.67 % of the farmers. In the present study the most common diseases observed are Black gill disease, IHHNV (Infectious Hypodermal and Hematopoietic necrosis Virus), White muscle disease, White gut disease, Running Mortality syndrome and White spot syndrome virus (WSSV). Lack of availability of quality shrimp seed from hatcheries is of great concern to 50.44% of the farmers. Other constraints reported include high feed cost (42.98%), poor cooperation among farmers (28.51%), poor water quality (21.05%), erratic power supply, differential rates of power tariff for shrimp culture (15.8%), lack of credit and insurance (10.95%) and lack of Government support (6.58%).

Table 5: Main Problems/ Constraints in Shrimp Culture

S.No	Problems/Constraint	Frequency (N = 228)	Percentage	Rank
1	Disease problem	152	**66.67**	**I**
2	Non availability of quality seed	115	**50.44**	**II**
3	High feed cost	98	42.98	III
4	Poor Cooperation among farmers	65	28.51	IV
5	Poor water quality	48	21.05	V
6	Current / power tariff cost	34	15.8	VI
7	Lack of Credit and Insurance	25	10.95	VII
8	Lack of Govt. support	15	6.58	VIII

Suggestions:

The various suggestions given by the farmers are shown in table -6. More than fifty percent (52.6%) of the farmers suggested that quality seed from hatcheries should be ensured from registered hatcheries by CAA. About 42.5% of the respondents suggested that through implementation of Information and communication technologies, price information should be disseminated to farmers. 28% of farmers suggested that shrimp farmers should be educated on the importance of Better Management Practices (BMPs) particularly on water quality and they also felt that a separate reservoir pond should be maintained for drawl of water and filtration of water by every farmer. 24.5% of farmers felt that, there is need to control the feed rates by the Government. Ensuring the contents and proximate composition of chemicals and probiotics on the label of the packet to be used for shrimp farming was suggested by 22.8%. The establishment of disease diagnostic labs and provision of mobile labs at village level which is very important for controlling the disease was suggested by 21.4% of farmers. Institutional credit and insurance facility,

treating aquaculture on par with agriculture for power tariff, Government support, technical guidance in time are other important suggestions.

Table- 6: Suggestions for improvement of the shrimp farming practices in West Godavari district as suggested by the shrimp farmers

S. No	Suggestions	Frequency (N= 228)	Rank
1	Ensure Good quality of Seed	120(52.6%)	I
2	Price information through mass media	97(42.5%)	II
3	Educate farmers in BMPs	64(28.0%)	III
4	Control on feed rates	56(24.5%)	IV
5	Ensuring quality of chemicals, probiotics etc	52(22.8%)	V
6	Disease diagnostic centres / labs availability	49(21.4%)	VI
7	Credit and insurance	44(19.2%)	VII
8	Electricity tariff concession	37(16.2%)	VIII
9	Government support	29(12.7%)	IX
10	Technical guidance in time	26(11.4%)	X

CONCLUSION

Shrimp farming is highly resilient in West Godavari. The farming system in the district has unique features such that the shrimp culture is practiced in low saline waters besides in medium and high salinity waters. There will be mixing of bore well and creek waters with fresh irrigation water for shrimp culture. Though the impact of disease is comparatively less in low saline waters, the farmers should stock healthy and disease free seed. The lack of availability of quality seed is the major problem for sustainability of the shrimp farming. Disease outbreaks also appeared to be the major threat to shrimp farming. In this connection it was suggested that a mechanism for seed certification by the State fisheries department has to be developed to ensure supply of healthy and quality shrimp seed. There is need to bring a comprehensive legislation on the practice of BMPs in general and quality of seed in particular in the shrimp farming. There is a high need to control the unregistered hatcheries by the CAA. Though Shrimp aquaculture has contributed significantly in employment generation and infrastructure development of the coastal community, yet small and marginal farmers are still to be benefited from the shrimp farming. This issue can be addressed to some extent by organising the farmers into Farmer Producer Organisations (FPOs). There is a need to bring Insurance particularly for small and marginal farmers and the Government should contribute certain percentage of the premium to reduce economic risks involved in the shrimp farming. There is also need to bring the regularisation of shrimp farming in non – regularised areas (where shrimp farming is practiced in Government vacant and assigned lands). Government should establish Aquatic Quarantine Facilities (AQF) and Brood Stock Multiplication Centres for sustainability of Shrimp farming in Andhra Pradesh.

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The present study analyzes the technical efficiency of the shrimp famers of East Godavari district of Andhra Pradesh using the Stochastic Production Frontier Function with the technical inefficiency effects. The estimates mean technical efficiency of the farmers was 93.06 % which means the farmers operate at 6.94 % below the production frontier production.Â Sivaraman I, Krishnan M, Ananthan P. S, Satyasai KJS, Krishnan L, Haribabu P, Ananth P. N. Technical Efficiency of Shrimp Farming in Andhra Pradesh: Estimation and Implications. Curr World Environ 2015;10(1) DOI:http://dx.doi.org/10.12944/CWE.10.1.23. Copy the following to cite this URL Available resources in West Godavari District: Agriculture and Horticulture Resources such as Paddy and its Bi-Product Rice Bran 2. Mango 3.Maize 4.Coconut 5.Cashew 6.Sugarcane 7.Eggs etc., Mineral Based Resources such as Ball clay 2. Granite stone etc.Â To promote Andhra Pradesh as an attractive and competitive destination for industrial investments, the State Government has offered various incentives/benefits to all eligible new industrial enterprises set up in the State. Projects involving Expansion/Diversification of existing industries other than those specified in Annexure-I are also entitled for benefits offered under the policies mentioned below Assessing prospects for shrimp culture in the Indian Sundarbans: A combined simulation modelling and choice experiment approach. Marine Policy, Vol. 33, Issue. 4, p. 613.Â Assessment of groundwater salinity in Nellore district using multi-electrode resistivity imaging technique. Journal of Earth System Science, Vol. 123, Issue. 8, p. 1809.Â Electrochemical treatment of shrimp farming effluent: role of electrocatalytic material. Environmental Science and Pollution Research, Vol. 24, Issue. 7, p. 6061. So far, there is not much organic farming in developing countries and emerging markets. Many smallholder farmers cannot afford high-tech inputs, but they are not systematically applying the methods of organic farming either. Only very few run certified operations.Â RySS is based in Andhra Pradesh, one of Indiaâ€™s southern states, and Kumar gives advice to its government, which aspires to making the stateâ€™s agriculture organic by 2026. The method RySS has developed is called â€œzero-budget natural farmingâ€ (ZBNF).Â The state government of Andhra Pradesh wants to involve 6 million farmers by 2026 and hopes that all fields in the state will be used according to organic methods two years later. African policymakers so far do not spell out such ambitions. True to what Dr. Raju, formerly of ANGR Agricultural University, claimed, there was steady stream of shrimp farmers, paddy farmers, agriculture and aqua culture scientists to the three-acre tank at Ananda Farm in Kovvada Annavaram village, near Bhimavaram in West Godavari, district during the last few days. What surprised most of them was the way paddy was grown in the middle of shrimp farm full of saline water. Integrated farm.Â P. Muniratnam, a senior official of Agriculture department, said a deeper three-season study was required to measure the success. The department was doing a similar experiment with paddy and fresh water fish. You have reached your limit for free articles this month.