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A study on socio-economic profile of *Litopenaeus vannamei* (Boone, 1931) farmers of southern Andhra districts, India

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Abstract
In recent years Aquaculture production has grown enormously, *Litopenaeus vannamei* (white leg shrimp) species have been introduced to many coastal states of India. Andhra Pradesh is the second-largest producer, where approximately 70% of *Litopenaeus vannamei* consumed globally is farmed. The present study determined the Socio-economic profile of the shrimp farmers of the state was studied using an interview schedule. For this study, data was collected from three southern coastal Andhra districts. It was revealed that most of 51.12% of farmers are middle age, young age is 24.44% and old age is 24.44%, while in unorganized respondents, most of the farmers were 52.22% middle age, old age 38.89% and very poor are young age farmers 8.89%. It is observed that 28.89% in organized respondents have a primary school education, 24.44% were high school education, 23.33% can read and write, 15.56% were graduates and 7.78% were intermediate education level, while in unorganized respondents 22.22% can read and write, 21.11% primary school, 20% illiterates, 17.78% high school education, graduates are 13.33% and intermediate education was 5.56%. and it is clear that in organized respondents 65.56% were nuclear and 34.44% were joint family type, while unorganized respondents nuclear and joint were 77.785 and 22.22% respectively. It was concluded that the forward communities and SC/ST category, both in organized and unorganized farmers shows less interest in *vannamei* culture when compared with backward communities. Small-scale farmers were unorganized and most of the farmers did not have access to technological innovations and scientific applications.

Keywords: Aquaculture, *Litopenaeus vannamei*, shrimp farmers, socio-economic status

Introduction
Aquaculture is a great important sector, worldwide, serving as an alternative source to the traditional food production system to help accommodate the expansion of the human population (Ling Cao, 2012) [9]. The Indian sub-continent is bestowed with a long coastline and hence offers a vast scope for large utilization of marine resources. Till a few years back, fishermen in India involved themselves in traditional marine fishing. In the seventies, fishermen started concentrating on catching prawns, more commonly known as `shrimps' due to high profitable return on the same on account of their export value. Brackish water prawn farming started in a big way during 91-94, especially in the coastal districts of Andhra Pradesh and Tamil Nadu.

Litopenaeus vannamei is the most commonly cultured shrimp in Latin America and Shrimp farming plays a multidimensional role in generating employment and alleviating poverty and uplifting the socio-economic communities of those who are directly and indirectly involved in aquaculture practices. *L. vannamei* farming has grown from a traditional, small-scale business in Southeast Asia into a global industry (Joseph Selvin *et al*., 2009) [5]. Shrimp farming provides direct employment to about 0.3 million people and ancillary units provide employment for 0.6 to 0.7 million people in our country (Unnithan, 2006) [18]. In recent years *Litopenaeus vannamei* (BOONE, 1931) [1] is the most commonly cultured shrimp in India. Andhra Pradesh is the second-largest producer, where approximately 70% of *Litopenaeus vannamei* consumed globally is farmed. India is ranked among the top five shrimp farming countries globally, and occurs mainly in the eastern coastal state of Andhra Pradesh. According to Gunalan Balakrishnan *et al.*, 2011 [4], the development of shrimp farming is an important activity in the coastal waters of Andhra Pradesh in India. A Large number of corporate shrimp farms with foreign collaboration also emerged, adopting a scientific culture system with integrated facilities for the production of shrimp seeds, feed, and processing, but did not continue this trend for long as they failed to make profits, and consequently, shrimp farming became more or less a small farmer activity.

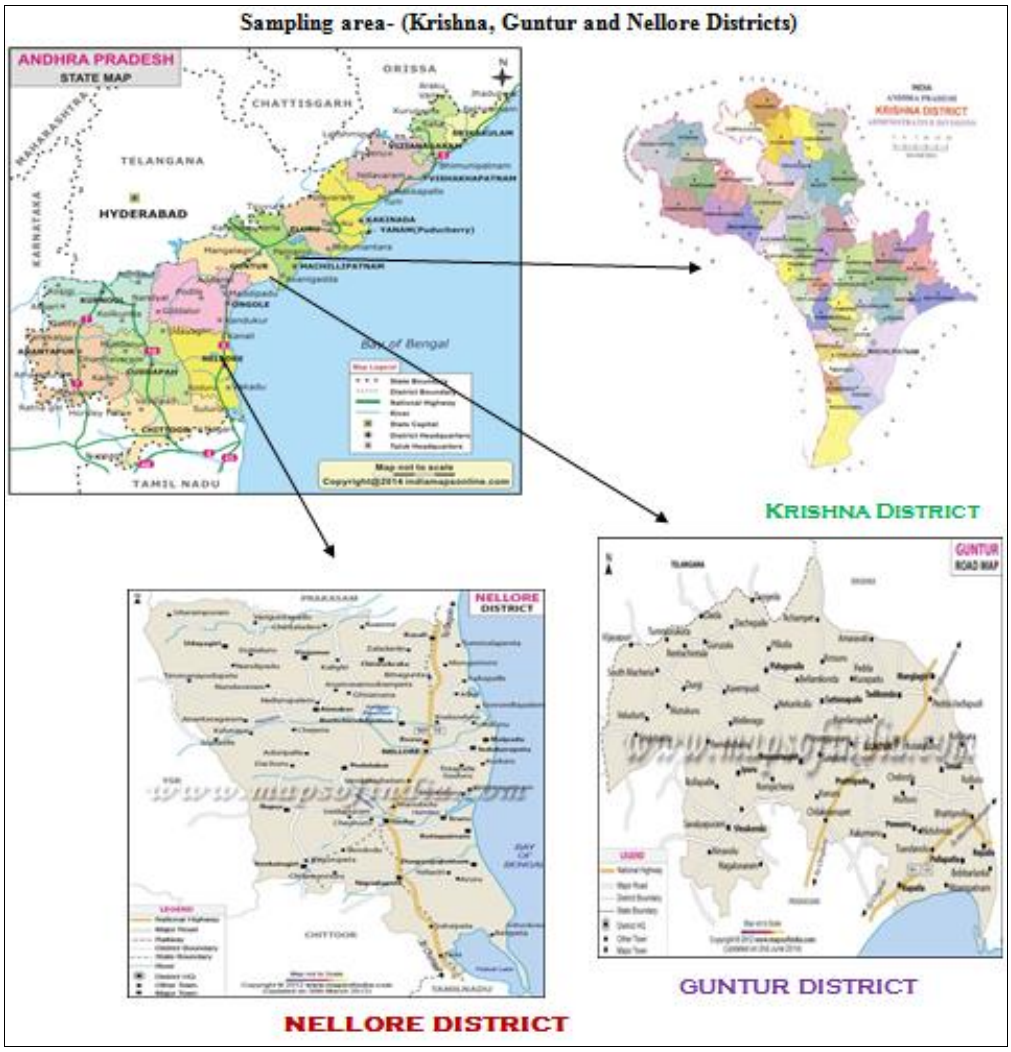
The small-scale farmers were unorganized and most of the farmers did not have access to technological innovations and scientific applications. Srinivas D and Venkatrayalu C H. 2016, [14] explained the present problems and prospects of shrimp farming in the West Godavari district (AP). Koteswari N *et al*., 2014 [7], reported that the Impact of Aqua Societies on shrimp farming in Andhra Pradesh, India. Vadher KH and Manoj K. 2014 [19], also reported that the Socio-economic profile of shrimp farmers of Gujarat State, India. The present study attempts to understand the socio-economic profile among shrimp farmers during the crop year 2019-20 in the districts of Nellore, Guntur and Krishna, which falls under Southern Andhra Pradesh.

Materials and Methods

The main focus of the investigation is to study the knowledge level and psychological variables of the shrimp farmers and the extent of adoption level towards better management practices in *Litopenaeus vannamei* shrimp farming. The present study *L. vannamei* Farming, was conducted during the crop year 2019-20 in the districts of Nellore, Guntur and Krishna (Fig.1), which falls under Southern Andhra Pradesh which covers the organized (Better Management Practices-BMPs Adopters) and Unorganized (conventional-Non BMPs adopters) farmers who have taken up shrimp (*L. vannamei*) culture in the entire three districts of Nellore, Guntur and Krishna of Andhra Pradesh state.

At the first stage, the study will be confined to the southern coastal districts of Andhra Pradesh, where shrimp farming activity is practiced on a large scale and reported high production by beneficiaries (shrimp farmers). The Krishna, Guntur and Nellore districts represent large shrimp cultivated area over other districts of coastal Andhra Pradesh and they represent rich irrigation sources and rich varieties of soils that have a prominence in agriculture and shrimp culture. Based on this phenomenon, out of nine coastal districts of Andhra Pradesh only three districts *viz*. Nellore, Guntur and Krishna were purposively selected for the sample collection.

The primary data was collected through a well-designed questionnaire. Shrimp culture farmers from the three districts were identified by mandal wise basing on the farming area and available production. In the Krishna district, 2 mandals, namely Nagayalanka and Koduru, in Guntur district 3 mandals namely Karlapalem, Pittalavanipalem and Repalle, in Nellore 3 mandals namely Chillakur, Indukurpeta and Bogole were selected for the study. The study, were carried out on both personal and enterprise profile which includes gender, age, education of the farmer, religion, ownership, occupational status, financial assistance, etc. The number of crops per year, stocking density, harvesting type, annual income, etc. were also carried out. The data was mainly collected from farmers who are involved in shrimp culture and practices and the data was also collected from other farmers association members and community leaders. The strict interview schedule was used to collect the data and all the gathered information was analyzed, calculated and presented in tabular form.



Results and discussion

The present study mainly focused on the socio-economic status of shrimp farmers in Southern Andhra Districts (Table - 1). Data and information of the socio-economic profile of shrimp farmers were collected.

Table 1: Sampling area Personal profile of Shrimp farmers

Name of the District	No. of Mandals in the District	Area covered under Shrimp Cultivating Mandals	Total No. of Shrim Farmers	Selected Mandals
Krishna	50	6 mandals	1744	Nagayalanka
		(2306.15 Ha)		Koduru
Guntur	57	6 Mandals	1246	Karlapalem
		(1578.46 Ha)		Pittalavanipalem
				Repalle
Nellore (Potti Sriramulu)	45	13 Mandals	1999	Chillakur
		(4405.50 Ha)		Indukurpeta
				Bogole

1. Sample Size

The technique of proportionate random sampling was adopted to select the required number of respondents (Organized and Unorganized farmers) in each mandal. In every district number of *L. vannamei*, culture farmers were identified in every mandal. In the Krishna district 2 mandals are selected, in each mandal 15 organized and 15 unorganized farmers were selected. In Guntur and Nellore (Potti Sriramulu) districts 3 mandals were selected, in each mandal 10 organized and 10 unorganized farmers were selected at randomly. Consequently, the sample size consists of 180 respondents was selected from the identified mandals. Out of these 180 respondents, 90 respondents were organized farmers (BMPs adopters) and the other 90 respondents were from the Unorganized (Conventional-Non BMPs adopters) farmers community.

Table 2: The particulars of the selected respondents were given in the below

S. No	District	Name of the Mandal	Total No. of identified Respondents	No.of respondents selected	Organized Respondent	Un organized Respondent
1	Krishna	Nagayalanka	940	30	15	15
		Koduru	505	30	15	15
2	Guntur	Karlapalem	249	20	10	10
		Pittalavanipalem	242	20	10	10
		Repalle	405	20	10	10
3	Nellore (potti Sriramulu)	Chillakur	170	20	10	10
		Indukurpet	264	20	10	10
		Boleog	253	20	10	10
Total Respondents Selected=180(90 Organized and 90 Un-Organized Respondents						

2. Age

Age is the most important factor in the *L. vannamei* culture; because it is influencing the adoption of culture, take decisions and how to handle the risk factors. From the table - 3, in organized respondents most of 51.12% of farmers are middle age, young age is 24.44% and old age is 24.44%, while in unorganized respondents, most of the farmers were 52.22% middle age, old age 38.89% and very poor are young age farmers 8.89%. Similar results were finding with Kanokwan Tammaroopa *et al*., (2016) [6] and mainly were half of the shrimp farmers had age between 41-55 years. Similar findings were reported by Ogunmefun, and Achike (2017) [10] that the majority of farmers within aged between 35-40 years.

Table 3: Age profile of the shrimp farmers

S. No	Category	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	Young age (below 30 years)	22	24.44	8	8.89
2	Middle age (31 -45 years)	46	51.12	47	52.22
3	Old age (46years and above)	22	24.44	35	38.89

3. Education of farmers

Education is based on the socioeconomic factor, shrimp culture is a scientific one, and it needs more knowledge to know different techniques. If the farmers were educated, they will easily understand the system and different techniques in shrimp culture. From the table-4, it is observed that 28.89% in organized respondents have a primary school education, 24.44% were high school education, 23.33% can read and write, 15.56% were graduates and 7.78% were intermediate education level, while in unorganized respondents, 22.22% can read and write, 21.11% primay school, 20% illiterates, 17.78% high school education, graduates are 13.33% and intermediate education was 5.56%. From the table, it reveals that there are no one illiterate present in organized respondents, but 20% of unorganized respondents are illiterates and they are doing the culture in traditionally. The present result of organized farmers is similar with Dona *et al*., (2016) [3] and reported that no one farmer was illiterate, but it

is different with unorganized illiterate farmers (20%). The present results in both organized (28.89%) and unorganized farmers (21.11) were similar with Srinivas and Venkatrayulu (2016) [14], reported that 54.8% of shrimp farmers had educational level of below 10th class. The reports of Ogunmefun and Achike (2017) [10] show that majority (60%) of his study area with secondary education farmers, which is differ with the present results.

Table 4: Education Levels of the respondents

S. No	Category	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	Illiterate	0	0	18	20
2	Can read and Write	21	23.33	20	22.22
3	Primary School	26	28.89	19	21.11
4	High school	22	24.44	16	17.78
5	Inter/Diploma	7	7.78	5	5.56
6	Graduate	14	15.56	12	13.33

4. Family Type and Family size

From the table it is clear that in organized respondent 65.56% were nuclear and 34.44% were joint family type while in un organized respondents nuclear and joint were 77.785 and 22.22% respectively (Table-5). It is clear that the un organized respondents were living together and sharing their ideas among them are very high when compared with organized respondents. Family size (Table -6) is also an important socio economic factor because it includes the income, food consumption and work sharing among them. The family size has more influence on the income and expenditure of the family (Pandey and Upadhayay, 2012) [11]. The results of present study in organized (65.56%) and un organized farmers 77.78%) were similar with Cyril *et al*., (2013) [2] reports that 68% of shrimp farmers had nuclear family. The similar results were appear in Kanokwan Tammaroopa *et al*., (2016) [6] and also Srinivas and Venkatrayulu (2016) [14]. Under this study in organized respondents had small family (<4 members) was 56.66%, medium family (4 to 6 members) 31.11% and large family (>6 members) 12.22% while in un organized respondents small family 35.55%,medium family 43.33% and large family 21.11%.

Table 5: Family profile of the respondents

S. No	Category	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	Nuclear	59	65.56	70	77.78
2	Joint	31	34.44	20	22.22

Table 6: Family size of the *vannamei* farmers

S. No	Family size	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	<4	51	56.66	32	35.55
2	4 to 6	28	31.11	39	43.33
3	>6	11	12.22	19	21.11

Enterprise profile of Shrimp farmers

1. Occupational Status

Alternate income source provides financial assistance and it is helpful during the crises for the farmers. It was observed that from the table organized respondents, 86.67% were depends only shrimp culture as a primary occupation,13.33% were depends on shrimp culture as a secondary occupation, while in un organized respondents they have also 85.56% were depends shrimp culture as primary,14.44% were shrimp culture as secondary occupation. Organized and un organized respondents both are treated shrimp culture was primary occupation for them (Table-7). The similar results were appeared in Vadher KH and Manoj K. 2014 [19].

Table 7: Occupation and Economic status of the farmers

S. No	Category	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	Shrimp culture as a primary occupation	78	86.67	77	85.56
2	Shrimp culture as a secondary occupation	12	13.33	13	14.44

2. Caste of the Farmers

Caste is the most dominant socio-economical factor in the society, which includes that financial assistance and lack of awareness. The results of the present study in organized farmers were the majority of *L. vannamei* culture was formed by backward communities 73.33%, SC/ST communities were 14.44% and forward communities were 12.22% while in un organized backward classes occupy 72.22%, forward communities occupy 22.22% and SC/ST communities were occupy 5.56%.The poor contribution of SC/ST communities in *L. vannamei* culture due to low level of financial assistance and lack of awareness about of *vannamei* culture. With the present study it can be conclude that *L. vannamei* culture was mostly carried out by backward communities in both organized (73.33%), unorganized (72.22%) farmers (Table-8).

Table 8: Caste profile of the respondents

S. No	Category	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	SC/ST	13	14.44	5	5.56
2	Backward communities	66	73.33	65	72.22
3	Forward communities	11	12.22	20	22.22

3. Housing and Land Profile of Farmers

The results pertaining to type of house possessed by the *vannamei* farmers were presented in table -9. It shows that most of organized (92.22) and un organized former (92.22) had RCC type of houses. Tile roofed houses in organized and un organized formers were 5.56% and 2.22% respectively. Organized Formers living hut/shed was 2.22 while un manage farmers was 5.56%. The results in the Table -10 also indicated that the majority in organized formers (90%) were holding up to 5 acres of land,5 to 10 acres occupy 7.78% and above 10 acres land holding 2.22% while in un organized farmers occupy 77.77% (up to 5 acres),15.56% land occupy (5 to 10 acres) and 6.67% land occupy(above 10 acres).It is clear that majority of the formers organized and un organized farmer participated in small scale *vannamei* culture (up to 5 acres). Kumaran *et al*.,(2003) [8] found similar results that the shrimp farmer surveyed most were small farmers having a farm size up to 5 acres and Swathi Lekshmi *et al*.,(2005) [16] and (2008) [17] reported 63.33% gad big shrimp farmers. Srinivas and Venkatrayulu (2016) [14] reported that the most of the farmers were small scale, having a farm size less than 2 Ha forming area.

Table 9: Housing and Land profile of the Shrimp farmers

S. No	House Type	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	Hut/shed	2	2.22	5	5.56
2	Tile roofed	5	5.56	2	2.22
3	RCC	83	92.22	83	92.22

Table 10: Land profile of the *vannamei* farmers at different collection areas

S. No	Category	Organized (n=90)		Un organized (n=90)	
		Respondent	Percent	Respondent	Percent
1	No land	0	0	0	0
2	Up to 5 acres	81	90	70	77.78
3	5 to 10 acres	7	7.78	14	15.56
4	Above 10acres	2	2.22	6	6.67

Conclusion and Future Scope

The study being the first of its kind in selected districts of Andhra Pradesh state would set the pace and provide certain guidelines for future line of research on the diffusion aspects of composite shrimp culture practices and also to develop suitable and effective extension strategy.

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