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INCIDENCES OF LOOSE SHELL SYNDROME (LSS) IN CULTURED *LITOPENAEUS VANNAMEI*, ANDHRA PRADESH

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ABSTRACT

The present work was undertaken to study the loose shell syndrome (LSS) in farmed *Litopenaeus vannamei* during the period of 2014 - 2015. The affected shrimps were collected from cultured ponds of West Godavari, East Godavari and Prakasam districts of Andhra Pradesh, India and were subjected to microbiological studies. Four species of bacteria were isolated from the diseased shrimps and were identified as *V. harveyi*, *V. alginolyticus*, *V. fluvialis and V. parahaemolyticus* based on their morphological characteristics and biochemical tests. In the present study, it has also been observed that mineral deficiency, poor water quality, bad management practices and association of Vibrio bacteria may be the causes of loose shell syndrome in *L. vannamei.*

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INTRODUCTION

Despite of the higher growth in world production of cultured shrimp, there have also been staggering, periodic losses due to diseases (Flegel et al., 2008). Since, 1988, loose shell syndrome (LSS) has been reported in farmed shrimp in India. Thereafter, incidences of LSS in shrimp have been increasing every year. LSS is a chronic progressive disease of farmed shrimp. The exoskeleton of affected shrimp forms a sort of loose covering over the abdominal musculature, with a space in between muscles and carapace [1, 7]. The efficiency of feed conversion of affected shrimp was substantially declines and affected ponds suffer low-level progressive mortalities. Recently, LSS was reported in culture ponds of *Litopenaeus vannamei* from West Godavari, East Godavari and Prakasam, Andhra Pradesh. The affected shrimp shows the reduction of average daily growth rate, average body weight, and poor survival, and leading to a reduction in biomass production at the affected farms [5]. Since 2005, LSS has also been reported from Gujarat and Kerala on the west coast of India the shrimp farming community in India recognizes LSS as the most devastating disease in *L. vannamei*. The present paper communicates the bacteriological studies on LSS affected *L. vannamei.*

MATERIALS AND METHODS

Collection of shrimp samples:

A total of 150 LSS affected live shrimps (weight between 20-25 gm) samples were collected from cultured ponds of West Godavari, East Godavari and Prakasam districts, Andhra Pradesh. The affected live shrimp samples were brought to laboratory under sterilized conditions. Affected live shrimps were observed for gross symptoms by keeping them in glass aquaria. Morphological and behavioral symptoms of affected shrimps were recorded. For the isolation of bacteria from affected shrimps, standard procedure described by Lightner [9] was fallowed. Haemolymph drawn from affected shrimp and plated on Trytone Soy Agar (TSA) and Thiosulphate Citrate Bile Sucrose (TCBS). Inocula were taken from hepatopancreas and streaked on the surface of TSA and TCBS agar plates. Inoculated plates were incubated at 37°C for four to six days. Bacterial colonies were observed in incubated plated from 24 to 96 h. The purification of bacteria was done by subsequent culturing of bacterial cultures. Identification of bacteria was done on the basis of their biochemical tests as per the methods of Buchanan and Gibbons [3]. Biochemical tests such as Gram's staining, Catalase, Oxidase, MR-VP test, Urase, Oxidative/Fermentative test, and Citrate utilization tests were carried out in the laboratory condition.

RESULTS AND DISCUSSION

The loose shell syndrome is an important disease in shrimp culture systems in India causing significant economic losses. In the present study, incidences of Loose shell syndrome (LSS) was observed during 2014 and 2015 in *L. vannamei* farms of West Godavari, East Godavari and Prakasam districts of Andhra Pradesh. Among the three districts, highest percentage (41%) incidences of LSS were observed in Prakasam district while low percentages of incidences (20%) were observed in East Godavari (Fig.1).

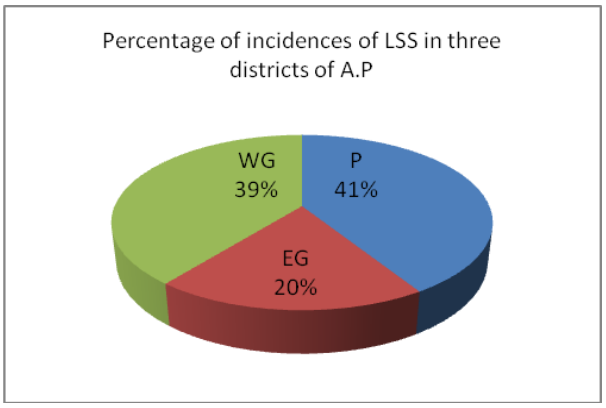

Fig.1 Percentage of incidences of LSS in various districts of A.P.

The affected shrimp were lethargic and anorexic, a thin paper like carapace, and a gap between the muscle tissue and carapace. The soft shell syndrome is due to the nutritional deficiency, exposure to certain chemicals and pesticides and poor water quality of ponds also reason for this problem [5, 6, 7]. Bad management practices are correlated with the incidences of loose shell syndrome in *L. vannamei.* The affected shrimp losses their weight during culture and in turns soft and a leathery shell. Significant reduction in daily growth rate was also observed in affected shrimps during middle of the culture. More or less similar symptoms were also observed in *P. monodon* by number of workers [5, 6, 7]. In the present study, four species of vibrio bacteria were associated with LSS affected *L. vannamei* in all the three districts. All the species were gram negative, rod shaped, motile and fermentative bacteria. *Vibrio parahaemolyticus* showed catalase negative while remains three species namely *V. harveyi, V. alginolyticus* and *V.fluvialis* were catalase positive. By virtue of biochemical tests conducted in the laboratory the isolated species of bacteria were identified as *Vibrio harveyi, V. alginolyticus, V. fluvialis and V. parahaemolyticus.* The results of biochemical tests conducted for the identification of bacteria is given in Table-1. The percentages of different bacterial pathogens were presented in Fig. 2. Climate changes and the aged ponds with high stocking densities in summer season shrimp is prone to loose shell syndrome. The affected shrimp have a paper-like carapace with a gap between muscle tissues. The affected shrimp lose weight and turn into a soft leathery shell. Significant reduction in growth rate was observed during the culture period

Table 1: Morphological and Biochemical Characteristics of Bacteria isolated from LSS affected shrimp, *L. vannamei.*

TEST CONDUCTED	*V. har*	*V. alg*	*V. flu*	*V. parahaemo*
Gram's test	-	-	-	-
Shape	R	R	R	R
Motility	+	+	+	+
Catalase	+	+	+	-
Oxidase	+	+	+	+
O/F test	F	F	F	F
Acid production from Glucose	+	+	+	+
NaCl tolerance test				
8%	+	+	+	+
10%	+	+	+	+
Decarboxylation of Amino acids				
Arginine	-	-	+	-
Ornithine	+	+	-	+
Lysine	+	+	-	-
Methyl red test	+	+	+	+
VP test	-	+	-	-
Indole test	+	+	-	+
Starch hydrolysis	+	+	-	-
Urea hydrolysis	+	+	+	-
Gelatin liquefaction	-	+	+	+
Utilisation of Carbohydrates				
L-Arabinose	+	-	+	-
Dextrose	+	+	+	+
Fructose	+	+	+	+
Lactose	-	-	-	+
Mannose	+	-	+	-
Galactose	+	+	+	-
Sucrose	+	+	+	+
Trehalose	+	+	+	+
Salicin	+	-	+	-
Xylose	-	-	-	-
Citrate utilization	+	+	+	-
Nitrate reduction	+	+	+	-
0/29 sensitivity	+	+	+	+

-:Negative, +:Positive, R: Rods, F: Fermentative.
(*V. h = Vibrio harveyi, V. alg. = V. alginolyticus, V. fluv. = V. fluvialis, V. parahaemo = V.para- haemolyticus*)

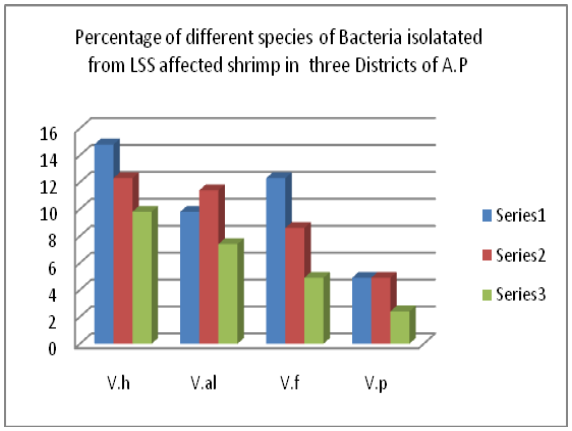

Fig: 2 Percentage of Different species of Bacterial Pathogens isolated from LSS affected Shrimp.

(Series1 - Prakasam , Series 2- West Godavari, Series3- East Godavari)
(V.h :*Vibrio harveyi,*V .al:*Vibrio alginolyticus,*V.f*: fluvialis,*V.parahae*:V.parahaemolyticus*)

Alavandi et al., [2] studied the loose shell syndrome in *Penaeus monodon* and observed the symptoms like flaccid spongy abdomen due muscular dystrophy, shrunken hepatopancreas and reduced feeding efficiency. Jayasree et al., [8] have isolated four species of vibrio bacteria from loose shell affected shrimps of coastal districts of Andhra Pradesh. Prakash et al., [10] reported co occurrence of LSS infection with other viral infections in cultured *P. monodon.* But such correlations were not observed in the present study. Further studies are needed to conform the causative agent(s) of the disease.

CONCLUSION

The present study has concluded that mineral deficiency, poor water quality, bad management practices and high loads of Vibrio pathogens may be the causes of the Loose Shell Syndrome in *L. vannamei.*

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CONFLICTS

No conflicts

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