CENTRAL MARINE FISHERIES
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R & D SERIES FOR MARINE FISHERY RESOURCES MANAGEMENT

15. 'SOFT' PRAWN SYNDROME AND ITS CONTROL

One of the factors adversely affecting the production of prawns in the culture fisheries, particularly in the semi-intensive culture system, is the incidence of 'soft' prawns. Although reliable estimation of the production loss on account of this syndrome is at present not available, it leads to poor or retarded growth, greater mortality rate and low value to the affected prawns. In certain cases, it causes total mortality of the stocked population in the culture system.

External Symptom

In the very early stage it is extremely difficult to differentiate externally between the prawns prone to 'soft' condition and the normal prawns that have moulted recently and are in the process of hardening of the exoskeleton. In the slightly advanced stage, the prawns developing the syndrome appear emaciated (as compared to the normal prawns), losing weight. The cuticle covering the cephalo-thorax and the abdomen except the rostrum becomes thin and fragile and is soft to touch. In the more advanced stage, in addition to these characteristics, the intestinal tract in the abdomenal region appears undulating, particularly in the first three abdominal segments. The firmness between the exoskeleton and the underlying muscles seen in the normal

prawns gets lost and it appears as if the cuticle is detached from the muscle as a loose jacket. The 'soft' condition first appears in a few specimen of the stocked population, but their percentage occurrence increases appreciably within a short period.

Species of Prawns Affected and Occurrence

The 'soft-shell' syndrome, by and large, is encountered in *Penaeus Indicus* and *P. monodon* among the prawns farmed in the coastal watars. It rarely occurs in *Metapenaeus dobsoni. M. monoceros* and *M. affinis* are found to be not susceptible to this condition.

This phenomenon is reported from the traditional prawn culture practice both from the seasonal and the perennial fields, in the prawns cultured in semi-intensive system and those cultured in polythene-lined ponds supplied with pumped sea water. However, the incidence of its occurrence is found to be more in the system where prawns are farmed throughout the year, generally without any supplementary feeding, and in the fields subjected to relatively lower water exchange rate either due to lower tidal amplitude or due to improper water supply facilities. It is reported from the backishwater fish and prawn culture fields in Vypeen Island near Cochin, from the fishfarm complex at Muthukad near Madras and from Mandapam.

The 'soft' prawn syndrome does not occur simultaneously in all the ponds of a particular locality. Although the prawns stocked in one pond of a locality may show symptoms of soft-shell, and subsequently may lead to mortality of the stocked population, the prawns stocked in the adjacent fields of the same locality having similar characteristics and supplied with the brackish water from the same source may not develop any symptom but may grow in the normal pattern.

The occurrence of 'soft' prawns in the culture fields is seasonal, being generally reported in February, March, May, June and July. Occasionally, it is encountered in September.

Pathobiological, Ecological and Physiological Observations

In *P. Indicus*, the 'soft' syndrome was found in the prawns measuring between 41 mm and 141 mm total length (measured from the tip of rostrum to tip of telson). The bulk of the affected population, however, belonged to the size group of 85-105 mm. No significant variation was observed in its occurrence between sexes. As to the food and feeding condition of 'soft' prawns, the gut was full or gorged with ingested food in less digested state. The gut content was composed of detritus, plant bits, filamentous algae, pennate diatoms, blue-green algae, foraminiferans and crustacean remains.

The growth pattern of *P. Indicus* stocked in the culture field at 13-15 mm size was observed to be normal, being at a rate of about 1.4 mm per day during the growth period of 60 days after stocking. As they became prone to 'soft' condition and as the syndrome progressed, the growth rate retarded considerably to 9.33 mm per day. Similarly, the weight loss suffered by the affected prawns ranged from 1.23 to 25.18% in comparision with the normal prawns.

The 'soft' prawn syndrome occurs in widely fluctuating ecological conditions, such as when the temperature of the water in the culture fields varies between 26.2°C and 39.0°C; salinity, 2.4-33.67‰; p_H, 6.06-9 33; dissolved oxygen, 0.45-8.38m1/1; redox potential (Eh), —27 to —418 MV; nitrite, 1.06-3.96 µg/at/1; nitrate, 1.76-56.00 µg/at/1; phosphorous, 0.74-57.0 µg/at/1; organic carbons, 0.75-5.11% and chlorophyll 'a' 0.02-0.23 µg/g/day. The macro- and mieo-benthic biomass in the culture field, although recorded in appreciable quality and quantity during January-May, decreased considerably during June-August when the increased incidence of 'soft' prawns was encountered. Similarly, blooms of *Peredinium*, *Mycrosystis* and *Synechosystis seline* along with green flagellates, *Tetraselmis* and *Chlorella* were also reported between May and September in the pond waters.

Physiologically, the mobilisation of calcium from haemolymph/muscles to the exoskeleton in 'soft' prawns was found affected. The juvenile *P. indicus* exposed to H_2S for 24 hours were found to suffer weight loss of about 7 3% at 30‰ salinity and 2.5‰ at 15‰ salinity, indicating symptoms of 'soft' phenomenon. The free aminio acids and protein content of haemolymph and muscle and percentage of dry matter were significantly lower in 'soft' prawns. The body composition of 'soft' prawns showed higher levels of moisture and ash content, and lower levels of lipids and protein. The histological observations of hepatopancreas indicated improper nutritional reserves in the organ.

Feeding Experiments on 'SOFT' Prawns

The feeding experiments conducted on 'soft' *P. indicus* with compounded diets in the laboratory showed that the dietary deficiency of calcium, phosphorus, Vitamin C and Vitamin B complex did not promote 'soft' condition. However, protein deficiency in the diet formed the significant limiting factor. The 'soft' prawns fed with protein-rich diet recovered and became normal within 9 to 14 days.

Conclusion and Control Measures

The ,soft-shell' syndrome in *P. indicus* would occur during adverse ecological conditions measured by increase or sudden decrease of temperature and salinity of the pond water, high soil pH and highly negative Eh, which in turn affect the available quality of food organisms in the pond, and the physiological processes of the prawn interfering the nutritional pathway and chitin synthesis.

The possible control measures are: (1) ensuring better water exchange in the pond during summer (March-May), (2) feeding of stocked prawns with protein-rich compounded feed and (3) periodical removal of organic debris and metabolites from the pond bottom.

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