Development and Field Demonstrations of Immunostimulant '*CIBASTIM*' by CIBA

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Focal Points at a Glance : In this contribution, the authors tell us about the product 'CIBASTIM' developed and introduced by the Central Institute of Brackishwater Aquaculture. The application of this product in BW ponds has resulted in proven control of vibrio and other diseases among shrimp in pond waters, for the reason that it is an immunostimulant with beneficial qualities that control / eradicate shrimp diseases in brackishwater ponds.

Diseases of shrimp, especially of bacterial infections are the major problems for sustainable shrimp culture in India. Vibriosis is considered to be the major bacterial infection causing mass mortalities in shrimp hatcheries and farms. Different species of *vibrio* are responsible for varied types of pathological conditions like tail necrosis, shell disease, red disease, loose shell syndrome (LSS) and white gut disease in grow-out shrimp culture systems. In spite of strict biosecurity practices, economic losses due to vibriosis are also encountered in shrimp culture. Following the ban on use of antibiotics, alternative strategies need to be evolved for effective control of infections in shrimp hatcheries and culture ponds.

Recently, interest has been generated on application of immunity stimulating agents through feed additives. The agents which stimulate the defence system of shrimp are complex carbohydrates, chemicals, nutritional factors, animal and plant extracts and products of bacterial origin. Amongst these, products of microbial origin like killed bacteria, glucans, peptidoglycans and lipopolysaccharide are gaining importance as immunostimulants.

Development of immunostimulants

Effort has been made at Central Institute of Brackishwater Aquaculture (CIBA), Chennai in the development of safe and effective immunity stimulating products for application in both hatcheries and grow-out shrimp ponds. Work was initiated under the ICAR AP Cess fund project on "Development and evaluation of shrimp immunostimulants using whole cell preparation of *vibrio*" with focus on products of microbial origin, targeting the non-specific immune responses in addition to improving the survival and growth of shrimp.

A product, namely 'CIBASTIM', has been developed under this project by using specific *vibrio* bacterial strain with appropriate modifications. Several yard experiments have been conducted in controlled conditions to assess the efficacy of the product both in larvae and cultured shrimp in hatcheries and grow-out systems. This product has shown promising results not only in conferring challenge resistance to virulent *Vibrio harveyi* (Fig.1), but also in improving the growth and survival of shrimp *P.monodon*.

Field demonstrations

Commercialisation of any product has to be first tested under controlled laboratory conditions and then it needs to be evaluated under field conditions. Extensive field demonstrations (over 100 nos.) of CIBASTIM have been conducted by the institute in the States of Tamil Nadu, Andhra Pradesh, Gujarat and West Bengal in the last 5 years. The dose, schedule and route of

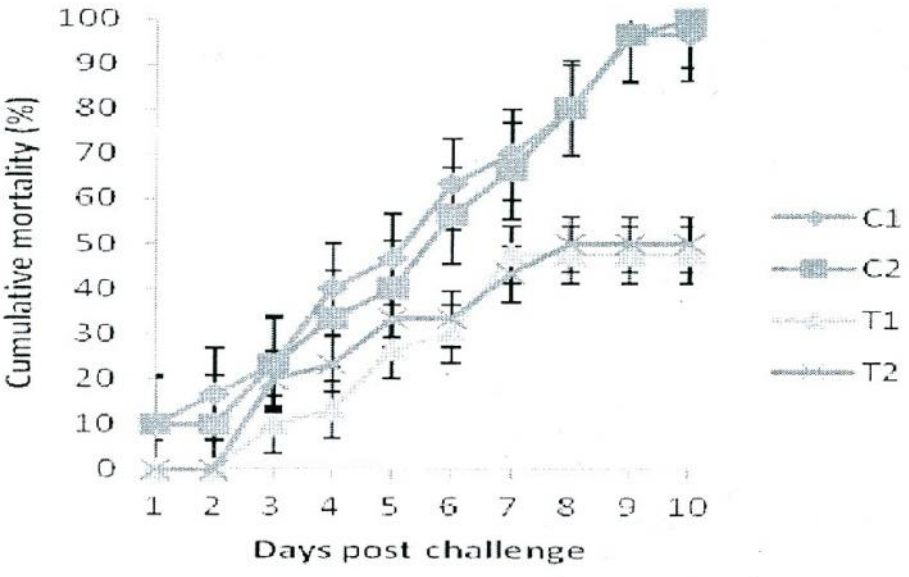

Fig 1 : Cumulative mortality in CIBASTIM fed shrimp, challenged with *V.harveyi*

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Table 1. Major findings of the farm trials of 'CIBASTIM' application

Improvement in —	Reduced incidence of -
Average body weight gain (ABWG)	Size variability
Survival	Tail rot
Production	Rostrum cuts
FCR	Black spots (melanisation) on the body
Pond bottom condition	Antenna cut

Table 2. Deformities observed in shrimp in control pond and in CIBASTIM treated ponds.

Parameter	Treatment (%)	Control (%)
Tail rot	0	17.5
Antenna cut	2.5	10.0
Rostrum cut	0	7.5
Black spot	0	17.5
Empty gut	0	87.5
White gut	0	17.5
Soft rostrum	12.5	30.0

Table 3. Performance of CIBASTIM fed shrimp in farmers' pond in different sites

	Site 1		Site 2		Site 3		Site 4		Site 5	
Particulars	T	C	T	C	T	C	T	C	T	C
WSA (ha)	0.5	0.5	0.9	0.9	0.8	0.8	1.0	1.0	0.88	0.89
Culture (days)	145	147	145	145	150	150	131	132	160	160
Stocking (pcs/m²)	7	7	5.6	5.6	5	5	6.6	6.6	8	8
ABW (g)	33.33	37.04	33.3	25	35.71	34.48	41.49	35.71	38.46	33.33
Size (Pcs/kg)	30	27	30	40	28	29	24.1	28	26	30
Biomassharvested	1050	900	1250	840	1200	800	2169	2027	2222	1736
Survival rate (%)	90	69.4	75.0	67.2	84.0	58.0	79.0	86.0	82.75	70.86
FCR	1.28	1.44	1.42	1.70	1.3	1.4	1.38	1.56	1.58	1.5
Production(kg/ha)	**2100**	**1800**	**1389**	**933**	**1500**	**1000**	**2169**	**2027**	**2525**	**1929**

application have been standardised successfully both under hatchery and pond culture conditions for *P.monodon*. Based on the farmers' observations and sampling studies, it was observed that CIBASTIM-administered ponds showed improvement in the production and in cost-benefit ratio. Application of CIBASTIM for two consecutive days in a week showed reduced incidence of size variability, tail rot, rostral cuts, black spots (melanisation on the body) and antenna cuts, compared to non-CIBASTIM-fed shrimp (Table 1 and 2).

Additionally, most of the farmers who used CIBASTIM opined that the treated shrimp were hard, sturdy with good colouration and were active. Besides this, many have expressed that the pond bottom and water quality conditions in treatment ponds were better than the controls. Laboratory studies too showed that the ammonia in water was within the permissible range of 0.05 to 0.15 ppm and 0.20 to 0.30 ppm in treated and control ponds respectively during the culture periods. The laboratory microbiological investigations revealed the significant reduction in the *vibrio* loads in the CIBASTIM treatment ponds compared to the controls.

The effect of CIBASTIM application as top-up feed when given to shrimps improved growth and survival and this could be due to the healthy pond environment in treatment ponds. Similarly, the lower FCR (Table 3) in CIBASTIM treated farm indicated that feed was efficiently consumed with less of wastage, leading to reduced accumulation of uneaten food at the pond bottom.

Future prospects

Based on the successful CIBASTIM demonstration trials, there is an increasing demand for this product from Gujarat farmers. The product is currently priced Rs.800/-/lit. The application of CIBASTIM showed an enhanced immune status and facilitated in maintaining favourable pond environment leading to overall improvement in shrimp production. Based on the positive response from the farmers and also the successful laboratory results, CIBA has initiated a scheme on 'upscaling the CIBASTIM production technology and field demonstrations' with funding from National Fisheries Development Board, Hyderabad. Presently, mass scale production and its economics are being worked out and the product is expected to be commercialised shortly.