Detrodigest™

(A tool for Bioremediation of Detritus in Aquaculture)

Bioremediation in aquaculture an emerging technology which opens up new possibilities for better and sustainable production with least disturbance to the surrounding environment. There are two approaches to the process of bioremediation. 1. Biostimulation (stimulating the native microorganisms to perform better) and 2. Bioaugmentation (introduction of new organisms for better activity). In fin and shellfish culture system hypolimnion of pond bottom is the most dynamic micro-ecosystem, which precisely determines the fate of grow outs in terms of production and onset of diseases. During the culture period, this thin sediment water interface is continuously modified with the deposition of un-eaten feed, faecal matter, moults, dead phyto or zooplankton etc. Accumulation of these detritus trough out the pond or in pockets leads to anoxic conditions paving the way for ammonia and hydrogen sulphide production, the two most toxic gases in aquaculture systems. Apart from aerating the water columns, another method to do away with the detritus is to apply highly efficient detritus degrading bacteria so as to prevent the accumulation of the former, avoiding massive dissolved oxygen demand. With this objective, a novel microbial preparation composed of Bacillus sp. has been designed for Indian Aquaculture sector and technically named as **'DETRODIGEST'.**

Salient features of Detrodigest

Indigenous - One of the basic requirements of a successful bio-augmentation process is the suitability of the microorganisms concerned in terms of their requirements for establishing in a region and to colonize and perform within a short period. The organism used for the preparation of Detrodigest is *Bacillus cereus* sensu lato MCCB 101 **(Genbank Acc. No. EF 062509)** isolated from aquaculture fields of Kerala and subjected to rigorous screening procedures. Extensive field level demonstration and validation over a period of five years has been made in Kerala and Tamil Nadu to ascertain its suitability in shrimp culture systems and it has proved to be an appropriate preparation for prolonged and safe detritus management in any aquaculture systems.

Euryhaline nature- An extensive study on the salinity preference of the organism in

Detrodigest revealed its euryhaline nature by growing and adequately producing hydrolytic enzymes at all salinities tested ranging from fresh water to seawater (0 - 45 ppt).

Versatility – The organism in Detrodigest are highly versatile with the potential to produce a variety of enzymes such as protease, lipase, chitinase etc. Another outstanding property of the organism is its capability to reduce ammonia, which gets liberated as a result of deamination and excretion by shrimp. This was very much reported during the field level demonstration programme as the ammonia content in all ponds, which received Detrodigest, was below toxic level (

Better algal bloom- As a result of the digestion of detritus, mineralization proceeds at faster rate resulting in phytoplanktion bloom, generally three days after the addition of Detrodigest. The bloom may remain for 10 days and for perpetual blooming repeated addition once in 10 days has been found to be fruitful. (Algal graph)

Application

For effective colonization in a micro-ecosystem, the introduced organism must be in sufficiently large numbers. Economic considerations dictate brewing Detrodigest at farm site by the farmers themselves. Accordingly, 300-ml Detrodigest containing 10^{23}-10^{25} cfu/ml would be required to obtain sufficient cell count for one-hectare pond by brewing overnight in 100 L medium.

PROTOCOL

Contents

Detrodigest 300 ml/hec, Pond water 100 L, Rice bran/wheat bran 100 gm, Shrimp feed (expired) 700 gm

Brewing Procedure

Filter pond water through muslin cloth, add coocked feed and rice/wheat bran, and empty Detrodigest and maintain overnight (12 hours) with occasional stirring or aeration. Dilute the probiotic preparation with adequate quantity of pond water and spray over the pond. Prepare during evening and apply during the morning hours.

Presentation

Detrodigest is presented in 100mL and 300mL polystyrene bottles sealed with aluminum foil. There are preparations available for fresh, brackish and marine waters. Other than grow out systems the specific preparation can be used for fin and shell fish hatcheries and ornamental fish production centres without brewing to get a final cell count of $1X10^6$ cells/mL rearing water. Brewing is required when it is used in grow out systems only where large volumes of the bio-augmentor is required.