



भाकृअनुप – केन्द्रीय खारा जलजीव पालन अनुसंधान संस्थान

ICAR - CENTRAL INSTITUTE OF BRACKISWATER AQUACULTURE ISO 9001:2008 CERTIFIED www.ciba.res.in

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Water Probiotic for mitigating ammonia and nitrite toxicity in shrimp aquaculture

Toxic nitrogen species in aquaculture: Modern intensive and semi-intensive production systems are the choice for mass production of aquatic species for domestic and export markets. Aquaculture ponds receive relatively large amounts of organic and inorganic nitrogen inputs. Fish and shrimp assimilate about 20-25% of protein fed into their body and the rest is released to the pond as ammonia and organic nitrogen. High pH and temperature increases the concentration of unionized ammonia and it is most toxic to aquatic organisms as it can readily diffuse through cell membranes and is highly lipid-soluble. Ammonia affects the central nervous system and loss of equilibrium and in extreme cases it leads to death. Additionally ammonia increases the susceptibility of aquatic animals to infectious and non-infectious diseases.

Microbial mitigation of toxic nitrogen species in aquaculture: In nature microbes play a major role in nutrient recycling to enhance natural productivity and maintain water quality. Toxic forms of nitrogen viz. ammonia and nitrite are converted to nitrate and nitrogen gas through microbes involved in nitrogen cycle mainly through nitrification and denitrification processes.

Nitrification and denitrification play a key role in environment. Nitrification is the process of biological oxidation of ammonia to nitrite followed by the oxidation of nitrite to nitrate. Nitrification involves two group of bacteria namely ammonia oxidizers (*Nitrosomonas* spp. and *Nitrosococcus* spp.) and nitrite oxidizers (*Nitrobacter* spp., and *Nitrospira* spp.). Denitrification is a respiratory process, carried out by heterotrophic bacteria in which nitrate (NO₃) and nitrite (NO₂) are converted into gaseous nitrogen intermediates viz. nitric oxide (NO), nitrous oxide (N₂O) and finally nitrogen (N₂).

What CIBA has on offer?

ICAR-CIBA through a decade of research on such environmentally relevant bacteria has a stock of come out with nitrifying and denitrifying bacterial consortia that are well suited for management of toxic nitrogen in brackishwater aquaculture systems. The product has

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been developed through enrichment and characterization of naturally occurring chemolithotrophic ammonia oxidizing bacteria (AOB), nitrite oxidizing bacteria (NOB) and denitrifying bacteria (DNB) from brackishwater ecosystems of India.

What the product does

Improves water quality of aquaculture ponds by

- Removing ammonia from aquaculture systems
- Removes nitrite and nitrate from aquaculture systems

Contents

Consortia of ammonia oxidizing bacteria (AOB), nitrite oxidizing bacteria (NOB) and denitrifying bacteria (DNB)

Dosage: One litre per acre once in a week

Cost of production: Production cost of the water probiotic is expected to be Rs. 75 per lit and has the potential to be sold at MRP Rs.750 per lit.

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