

Title of the PhD Dissertation

Biology and Production of Nutrient-Rich Small Fish Mola (*Amblypharyngodon mola*) & Darkina (*Esomus danricus*) in Ponds and Rice-fields

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Objectives:

- To understand the reproductive biology of mola and darkina
- To explore the existing production systems and practices of mola and darkina in selected regions.
- To develop suitable methods for mass production of mola and darkina in ponds and pond connected rice-fields.
- To understand the nutritional and economic benefits derived by the households involved in mola and darkina production.

A PhD research program was implemented with support from the project on Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD) during 2012-2014 for a period of three years. The research program enriches the understanding about the breeding biology of nutrient-rich small fish mola and darkina from on-station trails carried out at the Field Laboratory at BAU, Mymensingh. The on-farm trail on breeding biology of mola was carried out during April 2012 to March 2013 in hapas set up in an earthen pond using three treatments based on size of hapas; small (2 m³), medium (10 m³) and large (20 m³) with having two replicates. The stocking density of mola in hapa was 25g per m³. For darkina the research was carried out during April 2013 to March 2014 using 36 small hapas (size of each hapa 0.25 m³) and one 1m³ hapa set up in a 420 m² pond. The stocking density of darkina stocked was 10 fish in small hapa and 40 fish in large hapa. In case of breeding biology the biological characters *such as* gonad weight, gonado-somatic index (GSI), condition factor (K) of both sexes was observed. Cycle of gonadal maturation and month-wise variations were documented with their fecundity, size frequency of intra-ovarian oocytes in female. The results showed that mola breeding period continued from April-December. Fractional spawning behavior of mola along with asynchronous oocytes development has also been observed. Mortality of some female mola broodfish within short period after breeding was observed. Darkina found to be a multiple spawner; releasing its reproductive products in batches over three months two peaks in June-July & another in September-October.

In addition, on-farm research trails carried out in the NW region of Bangladesh with small-scale farming households revealed the culture potentials of small fish with carps in polyculture in ponds and rice-fields

systems using three treatments using stocking regimes (early, seasonal and existing stocking) during April to December 2012. For each treatment 18 replicates are used. In early stocking ponds mola attain maximum breeding frequency throughout the year which enhances the mola production and finally total fish production. The total fish production was the highest (3,783 kg ha⁻¹) in ponds with early stocking and the lowest (2,837 kg ha⁻¹) in existing/traditional stocking. The results showed that carps-mola polyculture in household ponds were suitable for rural poor farmers' whose benefited regular fish consumption both carps and mola. Carp-SIS polyculture in rice-field provide their farmers' nutrient-rich mola and darkina and also got cash income with carps as well.