

# Comparison of humidity chamber, MariSource hatching-tray and "Zuger" glass funnel incubation systems for breeding of *Cyprinus carpio* (L.) and *Clarias gariepinus* (Burchell)

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## Abstract

Humidity chamber, MariSource hatching-tray and "Zuger" glass funnel incubation systems were compared for hatching successes of both *Cyprinus carpio* and *Clarias gariepinus* fertilised eggs. The humidity chamber incubation system proved superior for *C. carpio*, whilst the MariSource hatching-tray system was better for *C. gariepinus*. Fungal infections greatly influenced hatching results.

## Introduction

The economic viability of a freshwater fish hatchery depends on optimal production of larvae and juveniles. Breeding methods and systems employed are largely determined by the specific hatching requirements of the particular species. Likewise, the sophistication of the breeding system(s) used is usually determined by the degree of technological expertise available, especially in developing regions.

The European common carp *Cyprinus carpio* L. is one of the most popular freshwater aquaculture species, with an annual global production of 900 000 metric tonne (Nash and Kensler, 1990). In southern Africa, warm-water fish production is rapidly expanding, with the sharptooth catfish, *Clarias gariepinus* (Burchell) being the major species cultured (Hecht and Britz, 1990).

In-depth studies have already been conducted on the environmental requirements and methodology employed for the successful hatching and rearing of *C. carpio* (Woynarovich, 1962; Soin, 1977; Woynarovich and Horváth, 1980; Rothbard, 1981; Schoonbee and Brand, 1982; Schoonbee and Prinsloo, 1984, 1986; Prinsloo et al., 1987) and *C. gariepinus* (Schoonbee et al., 1980; Hecht et al., 1982; Viveen et al., 1985; Hecht et al., 1988).

In South Africa, "Zuger" glass funnels and MariSource (Heath Techna) hatching-trays, or adaptations thereof, have proved to be relatively successful in the large-scale incubation of *C. carpio* and *C. gariepinus* eggs (Schoonbee et al., 1980; Hecht et al., 1982; Schoonbee and Prinsloo, 1984; Prinsloo et al., 1987). The removal of egg adhesiveness when using glass hatching funnels is, however, time-consuming and labour-intensive, and may lead to mechanical and chemical damage of eggs (Prinsloo et al., 1987), resulting in variable hatching success, especially for *C. gariepinus*. Furthermore, the prolonged time required for the hatching of carp eggs (approximately 50+ h - Woynarovich and

Horváth, 1980) increases the probability of severe fungal infections (e.g. *Saprolegnia* spp.) thus negatively affecting optimal production of larvae (Theron et al., 1991).

The above-mentioned constraints necessitated the search for a less labour-intensive, more efficient incubation system for the large-scale propagation of carp and catfish larvae. In the present investigation, the hatching results of a humidity chamber developed at the University of the North, Sovenga, South Africa, were evaluated for *C. carpio* and *C. gariepinus* against existing incubation systems.

## Materials and methods

### Hatching systems

Three incubation systems for the mass production of *C. carpio* and *C. gariepinus* larvae were used. These systems included "Zuger" glass breeding funnels (Woynarovich, 1962), MariSource (Heath Techna) hatching-trays (Prinsloo et al., 1987) and a recently developed humidity chamber incubation system.

The humidity chamber incubation system is designed to ensure that adhesive eggs are kept moist during embryonic development in air containing a high relative humidity. The humidity chamber (Fig. 1) consists of a Perspex unit 1 000 x 500 x 250 mm in size, mounted on top of a 1 000 l PVC water tank. The unit is subdivided and each subdivision fitted with 5 vertical sponges (465 x 205 x 35 mm) attached to Perspex hangers. Netting material (460 x 170 mm, 250 to 300 (um size) for the attachment of the adhesive eggs is mounted on both sides of each sponge. Total surface area of netting material for the humidity chamber therefore amounts to 1,564 m<sup>2</sup>, providing potential attachment for 0,8 million *C. carpio* and 3,1 million *C. gariepinus* eggs respectively. Two perforated Perspex trays fit tightly on top of the unit, with these perforations (4 mm diam. 40 mm apart) being sited above each vertical hanging sponge. Water is pumped into the trays and allowed to run through the perforations onto the centre line of each hanging sponge. Two water outlets (20 x 90 mm) are situated 20 mm above the bottom of each unit, ensuring entrapment of egg shells and debris.

The different incubation systems were connected to a common

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Received 1 November 1991; accepted in revised form 7 August 1992.