

MORPHOLOGICAL DIFFERENCES IN FIVE STRAINS OF GENETICALLY IMPROVED NILE TILAPIA (*OREOCHROMIS NILOTICUS*) USING GEOMETRIC MORPHOMETRICS

Cecille Vienne L. Oponda, Brian S. Santos*, Zubaida U. Basiao

Institute of Biology, College of Science, University of the Philippines Diliman, 1101, Quezon City, Philippines

Corresponding author: bssantos3@up.edu.ph

(Received: November 28, 2016; Accepted: May 22, 2017)

ABSTRACT

The determination of fish stock structure is important in developing optimal strategies for efficient management of aquaculture species. Morphometric analysis provides a robust, non-expensive, and statistically powerful means of stock delineation. In the Philippines, five strains of genetically improved Nile tilapia (*Oreochromis niloticus*) have been developed. This study sought to use geometric morphometrics to delineate among the five tilapia strains. Specimens were collected in June to December 2014 from various institutions in the Philippines. Images of 263 individuals were taken at four months old, and 17 landmarks were digitized. Multivariate analysis of variance (MANOVA) revealed significant shape differences between strains. The Canonical Variate Analysis (CVA) plot showed the SEAFDEC strain to be most unique in shape whereas close similarity was observed among specimens of GIFT Philippines, GIFT Malaysia and GET-EXCEL. Discriminant groupings by CVA reflect the historical relationships among the strains. Morphological traits such as the tip of the snout, insertion of the pelvic fin, ventral base of the caudal fin, and the anterior end of the dorsal fin can be used to differentiate one strain from another. Sexual dimorphism in shape was also evident. These results indicate the utility of geometric morphometrics in delineating strains of economically important fish species.

Key words: aquaculture, fish strains, genetic improvement, shape variation, stock delineation

INTRODUCTION

The tilapia is a group of cichlid fishes, which includes three economically important genera namely, *Tilapia*, *Oreochromis*, and *Sarotherodon*. It is an important commodity, ranking ninth in global aquaculture production and third in the Philippine aquaculture production (Fitzsimmons, 2000; Boyd, 2004; Fitzsimmons *et al.*, 2011). China, Egypt, Indonesia, Philippines, and Thailand are the principal producing countries of tilapia. The world tilapia production had been growing increasingly in recent years with 5.3 million metric tons in 2014 (FishstatJ, 2016). The tilapias are a great source of protein in protein-deficient inland communities (Mjoun *et al.*, 2010). Most importantly, its ability to grow fast, its large size and ease of culture are characteristics that make tilapia a desirable food fish.

In 1950, *Oreochromis mossambicus* was introduced in the country. It became a popular market fish but improper management of ponds resulted to small-sized fish (Guerrero, 1985). Introduction of another tilapia species, *O. niloticus*, in 1972 led to the expansion of tilapia industry in