

## USE OF DIETARY PHYTOCHEMICALS AS A NEW METHOD TO SEX-REVERSE NILE TILAPIA – AQUEOUS PLANT EXTRACTS VERSUS SYNTHETIC STEROIDS

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Many studies have focused on the use of chemicals produced by plants (phytochemicals) as sex steroid endocrine regulators. Such studies anticipate that phytochemicals will act as endocrine modulators by changing endogenous hormone profiles. These effects could be related to their aromatase inhibitory capacity among other unidentified mechanisms. If such activity is precisely expressed by these chemicals, they could provide a novel (alternative to synthetic inhibitors) mode of action to induce changes in the phenotypic process of sex differentiation in fish gonads. Natural plant chemicals with expected safer utilization and handling issues, and possibly lower toxicity for both fish and the surrounding environment, are a very attractive alternative.

We conducted a feeding trial on first feeding all-female Nile tilapia (>80% female). Fish were randomly distributed into glass aquaria in a recirculation system at a temperature  $26\pm 2$  °C, at the density of 60 fish per aquarium with three replicates per treatment. Experimental casein-gelatin based diets were prepared as follows: control (CON), 0.006% 17 $\alpha$ -methyltestosterone (MT), 1% spironolactone (SPIRO), along with the aqueous extracts of 0.1% (H100) and 0.5% (H500) of *Hibiscus macranthus* and mate (*Ilex sp.*), (M100 and M500 respectively), and 0.5% of maca (*Lepidium meyenii*) (MACA). In case of all plants, aqueous extracts were added to the diets on the dry matter basis. To obtain such aqueous extracts, 20 g of dry plant material was suspended in 1.5 l of distilled water for 12 hours, filtered using paper filters and resulting suspended solutions were freeze-dried to obtain dry powder extracts.

Fish were fed for 40 d, with periodical weight gain estimations at 14 and 28 d to readjust feeding ratio from 20 to 8%. Fish performance was evaluated in terms of the final individual body weight, survival (%), specific growth rate (SGR, %/day) and feed conversion ratio (FCR). The final sex was determined by microscopic analysis of gonad squashes at the end of the experiment.

Results indicated that the sex ratio of genetically all-female tilapia is not affected by the inclusion of the tested plant extracts; however the MT and SPIRO groups exhibited significant changes in sex ratio, 100% and 75% males, respectively (Fig 1). SPIRO affected negatively the survival of experimental fish ( $49.5\pm 15\%$ ) compared to the other treatments ( $94.3\pm 5\%$ ). No significant differences were observed in the final individual body weight ( $0.71\pm 0.07$  g), SGR ( $10.6\pm 0.2$  %/day) or FCR ( $0.94\pm 0.1$ ) among dietary groups.

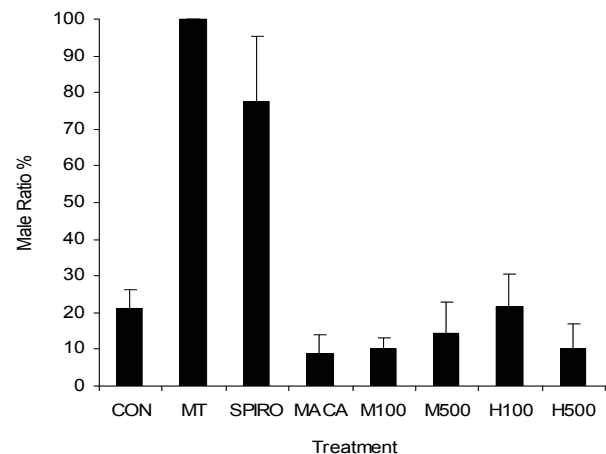


Fig 1. Final sex ratio per dietary treatment (Mean $\pm$ SD, n=3; 79-90 fish per diet were sexed).