

EFFECTS OF CITRUS ESSENTIAL OIL SUPPLEMENTATION ON THE GROWTH AND SERUM BIOCHEMICAL RESPONSES OF *OREOCHROMIS MOSSAMBICUS*

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EFEKTI ETERIČNOG ULJA CITRUSA KAO DODATKA U ISHRANI NA PRIRAST I BIOHEMIJSKE REAKCIJE SERUMA KOD MOZANBIČKE TILAPIJE *OREOCHROMIS MOSSAMBICUS*

Apstrakt

Akvakultura se razvila veoma brzo u proteklih 30 godina. Cilj akvakulture je da vodi računa o zdravlju riba i da poboljša njihove performanse. Antibiotici se često koriste protiv bolesti riba, za jačanje imunog sistema i u svrhe povećanja prirasta. Međutim, upotreba antibiotika je ograničena u mnogim zemljama zbog otpornosti koje stvaraju kod bakterija i zbog ostataka koje mogu da budu koncentrovani u vodenim organizmima i otpušteni u vodenu sredinu (Citarasu, 2010). Zbog toga istraživači pokušavaju da nađu alternativna rešenja, umesto upotrebe antibiotika u akvakulturi. Cilj ovog rada je da oceni efekte limunovog eteričnog ulja na prirast, hematološke i imunološke odgovore kod *O. mossambicus*.

U eksperimentu koji je trajao 90 dana, zdrava Mozanbička tilapija (prosečne težine \pm SD = 0.91 \pm 0.03 g) nasađena je u 12 akvarijuma (40L), svaki akvarijum sa po 25 riba. Hidro destilacijom dobijeno je limunovo eterično ulje iz sveže kore limuna. U ove svrhe korišćen je Clevenger system sa 150 g biljne suve materije i 1500 mL vode. Eterično ulje dodato je hrani za ribe sa 0, 1, 3 i 5 g/kg.

Hrana sa dodatkom limunovog eteričnog ulja od 1 g/kg uticala je na prirast i neke biohemijske parametre seruma.

Rezultati ovog istraživanja pokazuju da dodatak limunovog eteričnog ulja od 1 g/kg u ishrani ribe u toku od 90 dana ima pozitivan efekat, utiče na poboljšani prirast i neke biohemijske parametre u krvi *O. mossambicus*. Slični rezultati dobijeni su korišćenjem eteričnog ulja origana i nekih biljnih imunostimulansa (Gültepe et al., 2014).

INTRODUCTION

Aquaculture sector has showed a rapid growth in the last 30 years. The aim of aquaculture is to maintain fish health as well as to improve fish performance. Antibiotics are commonly used to control fish disease, enhance the immune systems and as an increase of growth performance. However, the usage of antibiotics has been restricted in many countries due to the resistance inducted to bacteria and the residues that they could release in aquatic organisms and food (Citarasu, 2010). Therefore, researchers are focusing on alternatives to the use of antibiotics in aquaculture. Thus, the aim of the present study is to assess the effects of citrus essential oil on growth performance, hematological and immunological responses in *O. mossambicus*.

MATERIAL AND METHODS

In a 90-day feeding trial, healthy cultured *O. mossambicus* (mean weight \pm SD = 0.91 ± 0.03 g) were stocked 25 fish per aquarium (40-L) on 12 aquariums. Citrus essential oil was obtained from fresh peel by hydro-distillation, using a Clevenger system with 150 g dry plant material and 1500 mL water. The essential oil was added to the feed at a rate of 0, 1, 3 and 5 g/kg.

RESULTS

Supplementation of citrus essential oil at level of 1 g/kg diet influenced the growth performance and some serum biochemical parameters.

DISCUSSION

In conclusion, the results of the present study demonstrated that, feeding with diet supplemented with citrus essential oil at 1 g/kg for 90 days has adequate beneficial effects on improvement of growth performance and some biochemical parameters of *O. mossambicus* blood. Similar results were obtained by the use of oregano essential oil and some herbal immunostimulants in fish diets (Gültepe et al., 2014).

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