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PII: S1050-4648(18)30255-9

DOI: [10.1016/j.fsi.2018.04.063](https://doi.org/10.1016/j.fsi.2018.04.063)

Reference: YFSIM 5279

To appear in: *Fish and Shellfish Immunology*

Received Date: 5 February 2018

Revised Date: 25 April 2018

Accepted Date: 28 April 2018

Please cite this article as: Baba E, Acar Ü, Yılmaz S, Zemheri F, Ergün S, Dietary olive leaf (*Olea europea* L.) extract alters some immune gene expression levels and disease resistance to *Yersinia ruckeri* infection in rainbow trout *Oncorhynchus mykiss*, *Fish and Shellfish Immunology* (2018), doi: 10.1016/j.fsi.2018.04.063.

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**Dietary olive leaf (*Olea europea* L.) extract alters some immune gene expression levels and disease resistance to *Yersinia ruckeri* infection in rainbow trout *Oncorhynchus mykiss***

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**Abstract**

The aim for the present study was to investigate the effects of olive leaf (*Olea europea* L.) extract (OLE) on the control of *Yersinia ruckeri* infection in rainbow (*Oncorhynchus mykiss*) trout and to assess the impact on the expression of immune-related genes in the spleen and serum biochemical parameters of rainbow trout. Five experimental diets were prepared by adding 0.0%, 0.1%, 0.25%, 0.50% and 1.0% of OLE. Each diet was fed to triplicate groups of fish (mean body weight 51.22±3.04g) twice a day (at 09:00 and 17:00 h) for 60 days. The dietary supplementation of OLE did not affect growth performance and feed utilization ( $P > 0.05$ ). Major changes due to graded levels of OLE in the diets were observed in blood biochemical parameters ( $P < 0.05$ ). TNF $\alpha$ , IL1- $\beta$  and IL-8 gene expressions were significantly up-regulated in OLE 0.1% group compared with others ( $P < 0.05$ ). Also, diet supplemented with OLE reduced mortality in rainbow trout fed with OLE 0.1% added diet. Present study suggests that OLE especially at 0.1% added feed may effectively enhance the serum biochemical parameters, survival rate and immune gene expression in rainbow trout.

**Keywords:** herbal extract, gene expression, disease resistance, rainbow trout, olive leaf extract

**1. Introduction**

The culture of *Oncorhynchus mykiss* in fresh water aquaculture has suffered due to bacterial infections particularly by enteric redmouth disease (ERM) caused by *Yersinia ruckeri*. *Y. ruckeri* is a Gram negative, motile, rod-shaped enterobacterium causative agent in fish [1]. It causes lethargic movements, loss of appetite, exophthalmia, hemorrhages and darkening of the skin [2]. ERM is one of the most important diseases of rainbow trout and leads to significant economic losses [3]. The commercial vaccines are expensive for fish farming practices and are specific against particular pathogens. Also, the use of antibiotics leads to

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