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AQUACULTURE & FISHERIES INNOVATION LAB

## RESEARCH REPORTS

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**Title:** Effects of dietary levels of essential oil (EO) extract from bitter lemon (*Citrus limon*) fruit peels on growth, biochemical, haemato-immunological parameters and disease resistance in Juvenile *Labeo victorinus* fingerlings challenged with *Aeromonas hydrophila*

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**Abstract:** AquaFish will not be distributing this publication. Copies may be obtained by writing to the authors.

Essential oils (EOs) are used in the food industry because of their biological activity. We evaluated the effects of administration of essential oil (EO) extracted from bitter lemon (*Citrus limon*) fruit peels on the growth performance, biochemical, haemato-immunological parameters and possible disease resistance in fingerlings (4 weeks old) *Labeo victorinus* challenged with *Aeromonas hydrophila*. Fish were divided into five groups and fed diets supplemented with *C. limon* fruit peels EO extract at 1%, 2%, 5% and 8% [as fed basis] and treatment compared with control group fed diet without *C. limon* fruit peels EO extract. The experiment was executed in triplicate. Concentration of plasma cortisol, glucose, triglyceride and cholesterol decreased while that of total protein and albumin increased as dietary inclusion of the EO extract of *C. limon* fruit peels was increased from 2% to 5%. Meanwhile haemato-immunological parameters including red blood cell (RBC), white blood cell (WBC) counts, haematocrit (Htc), mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC) and neutrophils increased with increasing dietary inclusion from 1% to 5% inclusion of *C. limon* fruit peels EO extract. Serum immunoglobulins, lysozyme activity and respiratory burst increased with increasing dietary levels up to 5% inclusion of EO extract of *C. limon* fruit peels. We demonstrate that formulation of feeds by incorporating up to 5% the EO extract from *C. limon* fruit peels significantly improved biochemical, haematological and immunological response in juvenile fish resulting to lower mortality than the untreated groups and appear to be effective antibacterial against *A. hydrophila*.

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