Evaluation of lemon verbena leaves powder (*Aloysia citrodora*) as a feed additive to improving hematological parameters and immunization in rainbow trout (*Oncorhynchus mykiss*)

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Abstract
Nowadays according to the progress in functional feed additives as well as plants potential, aquafeeds contain a wide range of plant addatives as a dietary administration based on the alternative sustainable strategy. this study was organized to determine the effect of lemon verbena leaves powder (Aloysia citrodora) on hematological indices and immune parameters in rainbow trout (Oncorhynchus mykiss). The results show that adding lemon verbena (LV) leaves powder (1 and 2%), increases the number of white and red blood cells, also, hematocrit and hemoglobin levels were enhanced in 1 and 2 % diet enrichment levels ($P < 0.05$). The fish feed contains 2% LV powder significantly increased MCV and MCH levels, whilst MCHC was highest in 0.5% level of LV powder compare to the other groups ($P < 0.05$) Furthermore, result shown that differentiated leukocytes counting with adding LV powder (0.5, 1 and 2%), does not affect significantly on Eosonophil, neutrophil, and monocyte ($P > 0.05$), but the level of Lymphocyte was increased in experimental diet with 1% LV powder ($P < 0.05$). an addition, presence of LV powder in experimental diet cause improving total immunoglobulin levels and raising lysozyme activity. Due to the limited use of antibiotics, the results of the present study showed that leaves powder can be used as a feed supplement to healthy and reduce the environmental issues in farming systems.

Keywords: Lemon verbena, Hematological indices, Immune parameters, Rainbow trout.