

Growth Performance of Tomato Plant and Genetically Improved Farmed Tilapia in Combined Aquaponic Systems

Abstract

Aquaponic system is an integration of aquaculture and hydroponics in a closed aquaculture system. Plants are able to grow without the presence of soil using natural fertilizer available in the system as a result of nutrients produced from nitrification process by the nitrifying bacteria. The aim of this study is to evaluate the growth performances of Genetically Improved Farmed Tilapia (GIFT) and tomato plant (*Solanum lycopersicum*) in a combined aquaponic system. This system is a mix of Deep Water Raft System (DWRS) using a styrofoam base with a small hole made for plant to float placed in a small pot filled with gravel used to support the plants and Media Filled System (MFS) applying a plant tank fully filled with gravel as media for the plant to grow. This study was conducted to determine whether combined aquaponic system could improve the effectiveness of the plant growth. GIFT gained 94% of body weight and tomato increased 96.3% in terms of plants height and started flowering (the early stage of fruit formation). Besides, the range in concentration of TAN ($0.29 \pm 0.4 \text{ mg L}^{-1}$), nitrite ($0.65 \pm 0.59 \text{ mg L}^{-1}$), nitrate ($1.29 \pm 1.29 \text{ mg L}^{-1}$) and phosphate ($0.57 \pm 0.1 \text{ mg L}^{-1}$) recorded in the culture system are suitable for facilitating the nitrification process. Analysis of the data proves that the combined aquaponic system is more effective than the single DWRS aquaponic system.