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Level of survival and growth performance of three lettuce (*Lactuca sativa* L.) varieties in an automated raft aquaponics system

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Aquaponics are famous as a soil-less culture for crop production. This study aims to determine the most suitable lettuce variety for automated Raft Aquaponics Systems by experimenting on the survival and growth rates of three lettuce varieties, commonly grown in soil-less culture. The experiment was carried out in two automated raft aquaponics systems, established under the same automated greenhouse conditions in the Faculty of Technology, University of Ruhuna, Kamburupitiya in a completely randomized manner. Three lettuce varieties (i.e. Green Cos (GC), Romaine F1 Hybrid (F) and Rocket (R)) were used to determine the most suitable variety for raft aquaponics systems. Plants were maintained under nursery conditions for two weeks and transferred to the grow beds where each grow bed contained seven randomly placed pots per variety. Plant height and leaf chlorophyll content of each variety were measured in weekly intervals while the number of leaves were counted on a weekly basis. Plants of both GC and R varieties survived throughout the period with 100% survival, while the F variety did not survive after 40 days. Thus F variety cannot be recommended for raft aquaponics systems due to its low survival rate. However, both GC and R varieties showed a continuous increase in leaf number and plant height throughout the period. Nevertheless, R variety showed a better plant growth than GC variety, maintaining higher plant height (R - 26.6±0.8 cm, GC - 25.0±1.0; $p < 0.05$), revealing that R variety to be the best for aquaponics systems. However, the leaf number was not significantly different ($p > 0.05$, tested with Chi-square test) in R and GC varieties. Moreover, R variety maintained a significantly higher chlorophyll level than GC from the initial stage (R - 19.6±1.8, GC - 6.3±0.4 SPAD units; $P < 0.05$) throughout the period. Higher chlorophyll content in R is indicative of its higher photosynthetic capacity and thereby greater yield with a better energy budget. Based on the observations, Rocket variety can be recommended for raft aquaponics systems over Green Cos and Romaine Fi Hybrid varieties to get the best lettuce harvest.

Keywords: Growth performances, Aquaponics systems, Chlorophyll, Lettuce