Effect of water irrigation volume on *Capsicum frutescens* growth and plankton abundance in aquaponics system

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Effect of water irrigation volume on *Capsicum frutescens* growth and plankton abundance in aquaponics system

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Abstract. This study aimed to understand *Capsicum frutescens* growth and plankton abundance in aquaponics culture. A Completely Randomized Design (CRD) with six treatments in triplicates comprising of treatment A (positive control using organic liquid fertilizer), B (negative control without fertilizer), C (drip irrigation aquaponics with a water debit of 100 ml/day/plant), D (drip irrigation aquaponics with a water debit of 150 ml/day/plant), E (drip irrigation with a water debit of 200 ml/day/plant), and F (drip irrigation aquaponics with a water debit of 250 ml/day/plant) was applied. The water used in treatments C, D, E, and F contained comet fish feces as fertilizer. *C. frutescens* growth and plankton abundance were observed. Analysis was conducted using analysis of variance for plant productivity and descriptive analysis for plankton abundance and water quality. The results of this study showed that the highest plant growth was seen in plants receiving F treatment with 50 ml/day drip irrigation. However, no significant difference was found when compared to the positive control with organic artificial fertilizer. Eleven types of phytoplankton and six types of zooplankton were found, with *Stanieria* sp. as the most abundant phytoplankton and *Brachionus* sp. and *Epistylis* sp. as the most abundant zooplanktons.

1. Introduction

Aquaponics system is one of the culture technologies that combine fish and plant cultures. This system excels because of its nature as an environmentally friendly system with more productive culture environment, producing fish and plants with a higher quality without using chemicals as fertilizer, pesticide, or herbicide [1].

One of the well-known aquaponics systems is the drip irrigation system. This system is known as a system that can save water through minimization of water loss that enables the system to be used in agricultural areas with limited water source. This creates an opportunity to broaden the market of the plants cultured using this system, including *Capsicum frutescens*, to include household, domestic, and export markets [2]. Currently, the demand for *C. frutescens* is quite high, i.e. around 4 kg/capita/year [3].

To meet the demand of the market for *C. frutescens* is not easy, especially with the low production of chili in Indonesia. Challenges faced in increasing the chili production in this country includes pest and disease attacks exaggerated by damaged soil due to toxic contamination of chemicals from the use of inorganic fertilizers or excessive use of pesticides. Hence, proper fertilizing process that pays more attention to soil conservation is needed [4].