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EFFECT OF DIFFERENT POTASSIUM (K^+) DOSES ON GROWTH OF TOMATO (*SOLANUM LYCOPERSICUM*) WITH PEARLSPOT (*ETROPLUS SURATENSIS*) IN A RECIRCULATING AQUAPONIC SYSTEM

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ABSTRACT : A 90-days experiment was conducted to evaluate the effect of different doses of potassium (K^+) on the production of tomato (*Solanum lycopersicum*) with pearlspot (*Etroplus suratensis*) in an aquaponic system for 90 days. Four different K^+ doses were assigned as treatments T_1 (20 mg/L), T_2 (40 mg/L), T_3 (60 mg/L), T_4 (80 mg/L) and C (without any potassium supplementation). Plant (tomato) to fish (pearlspot) ratio was taken as 4 plants: 0.86 kg/m^3 with hydraulic loading rate of 3 m/day for all the treatments. The K^+ supplemented unit T_4 (80 mg/L) recorded the highest tomato yield (0.527±0.01 kg) followed by T_3>T_2>T_1>C. Fish growth parameters showed no significant difference among the treatments T_1, T_2, T_3 and T_4. Considering the overall fish growth, health monitoring parameters, plant growth and water quality parameters, the K^+ dose of 80 mg/L (T_4) was found to be the most effective dose for tomato yield compared to other treatments. The experiment showed that the fish stocking density (0.86 kg/m^3), HLR (3.0 m/day) and K^+ dosage (80 mg/L) had a positive effect on the production of pearlspot and tomato crop in a recirculating aquaponic system.

Key words : Tomato, pearlspot, potassium, aquaponic system.

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INTRODUCTION

World fish food sector needs to secure food and nutrition for the growing population through increased production and reduced waste. The current escalating aquaculture industry is resulting in massive polluted waters and changes in land use (Delgado *et al*, 2003). The need for the development of sustainable, innovative, resource-efficient and locally appropriate farming solution is immense for densely populated nations with small economies (Thampy, 1980). Aquaponics could be a solution where fish effluent nutrients are used by plant and treated water returned to the fish rearing tanks. Aquaponics is a modern intensive food production solution to achieve more efficient water use by maximizing farm production without increasing water consumption (Rakocy *et al*, 2004).

In a secondary vegetative system, leafy vegetables and fruiting crops are successfully grown in an aquaponic system (Rakocy *et al*, 2006). Current research on aquaponics is mostly focused on integrating fish and plant species, the correlation between hydraulic loading rate, and nutrient removal (Nuwansi *et al*, 2019). Lettuce is the most grown crop in aquaponics due to its short harvesting time, less nutrient requirement and high demand. But high-value fruiting plants need longer harvesting time and high nutrients requirement when compared to leafy vegetables (Nelson, 2008). Fruiting plants require higher K ions for enhancing fruit growth and quality (Pettigrew, 2008). The deficiencies of potassium, calcium, and iron in fish feed have been reported (Adler *et al*, 1996a; Seawright *et al*, 1998). The potassium concentration is 45 times lower in aquaponics solution as compared to conventional hydroponics (Graber and Junge, 2009) and potassium deficiency often causes puffiness in fruit (Resh, 2016). Potassium along with other elements such as iron (Fe), manganese (Mn) and sulfur (S) are deficient in aquaponic solution (Seawright *et al*, 1998; Roosta and Hamidpour, 2011). In most of the commercial feed, the only input in aquaponic system, these elements are either not present or their fraction is too less to support plant growth. Thus, supplementation