

Performance of Black Soldier Fly (*Hermetia illucens*) Larvae in Different Growth Substrates

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Abstract

The increasing global population is driving higher demand for animal proteins, such as meat, eggs, and fish, which in turn elevates the need for sustainable animal feed solutions. Black Soldier Fly (BSF) - (*Hermetia illucens*) larvae have emerged as a promising alternative for converting organic waste into valuable biomass, providing a sustainable source of animal protein for animal feed. This study investigates the growth performance and survival of BSF larvae reared on various organic substrates commonly available in Sri Lanka; hotel food waste (HFW), household food waste (HHFW), vegetable waste, layer chicken litter (LCL), and crushed fruit waste with six biological replicates per each treatment. Results indicated that the larvae reared on HFW and LCL achieved the highest (one-way ANOVA, $P < 0.0001$) average weight of 174.38 ± 0.17 mg and 149.85 ± 0.17 mg per ten larvae at the end of the experiment period. The highest larval mortality was observed in HFW and HHFW (Kruskal-wallis Test, X^2 ; 23.6336). Even though HFW achieved the highest larval weight, it also showed the highest motility; hence HFW cannot be an ideal growth media for the growth of BSF larvae. This study highlights LCL as the superior substrate for BSF larvae rearing due to its favourable combination of the highest larval growth and the lowest mortality rate. The efficient biomass production using LCL offers a sustainable approach for the animal feed industry, improving waste management, enhancing sustainable animal husbandry, and promoting agricultural productivity. The growth of BSF larvae can be varying with different moisture contents and temperature of the growth media. Therefore, as a future implication of this study, the growth performance and mortality rates of BSF larvae are essential to be investigated under different moisture and temperature regimes.

Keywords: *Alternative Protein Source, Black Soldier Fly, Growth Performance, Growth Substrates, Waste*