

Abstract

Black soldier fly larvae (BSFL) can efficiently convert abundant organic waste, such as soybean curd residue (okara), into biomass rich in protein and lipids, which can be processed into animal feed, lubricants, or biofuel. The growth performance of BSFL highly relies on its gut microbiome, which is affected by substrate and developmental stages. Currently, BSFL rearing practices have left microbial colonization to chance; thus, there is a need for microbiome engineering strategies, like probiotic supplementation, to improve larvae growth. Hence, this study aims to isolate potential probiotics from different developmental stages of BSFL reared on different substrates, evaluate their effects on growth performance (i.e., average larval length and weight) and conversion efficiency parameters (i.e., bioconversion efficiency and substrate reduction efficiency), as well as their ability to colonize the BSFL gut through detection of GFP-labeled microbes or similar colony morphology with supplemented isolate. In this study, seven isolates were successfully isolated from the neonates, five-day-old larvae, fifth-instar larvae, and prepupae of BSFL, which are *Mammaliicoccus sciuri*, *Serratia marcescens*, *Arthrobacter sp.*, *Bacillus sp.*, *Providencia sp.*, *Morganella sp.*, and *Klebsiella oxytoca*. However, none of these isolates significantly improved any of the growth performance and conversion efficiency parameters tested, nor did any succeed in colonizing the BSFL gut. This could be attributed to insufficient supplementation concentrations or the strains isolated not having probiotic effects. As such, future research should explore higher concentrations of supplementation and evaluate a broader range of microbes to find strains beneficial for BSFL.

Keywords: Black soldier fly larvae (BSFL), Growth analysis, Gut colonization, Isolation, Probiotics.