The Effect of Substrate Type on Black Soldier Fly Larvae Mass

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I investigated different substrates for the larvae (BSFL) of the black soldier fly (BSF). These larvae have great potential as an environmentally, economically sustainable protein source for livestock. Additionally, BSFL waste (frass) is an organic biofertilizer. In this investigation, residues of leading African crops (corn stover, peanut haulms, sugarcane trash, sugarcane bagasse (processing waste)) were used as substrates to determine substrate-to-BSFL mass conversion ratios. A study to determine such conversion ratios had not previously been conducted. Larvae (~10,000 per bin, estimated by BSFL supplier (EVO Conversion Systems, LLC)) were placed in ten bins containing each prepared (ground and hydrated) substrate. After 8-24 days, varying based on maturation status, the larvae in a bin were manually harvested and weighed (process repeated for all ten bins). Using measurements gathered throughout experimentation, conversion ratios were calculated. Protein-rich substrates yielded the highest conversion ratios with the exception of cabbage (low protein), which suggested that although substrate nutritional content is critical to mass conversion, substrate preparation is also vital. The calculated crop residue-to-BSFL mass conversion ratios could prove valuable to livestock rearing and in turn to food security, particularly in rural regions of developing nations. A recent World Bank study on BSFL estimated that mainstreaming BSF farming across Africa could yield a crude protein market value up to $2.6 billion. This investigation could become the launching pad for further study of BSF farming and its strong potential to alleviate hunger in developing countries.

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