Abstract

Inappropriate handling of the abundant organic waste generated annually has far reaching impacts on the environment, economies, and societal well-being. Insect based technologies are gaining traction in the recycling of organic waste and the recovery of valuable macro- and micronutrients. However, there is little information about the costs and benefits of using black soldier fly (BSF) in recycling organic waste into fertilizer compared to conventional composting. This study determined factors influencing the adoption of BSF and its cost-effectiveness in recycling organic waste using logistic regression, cost-benefit analysis, and sensitivity analysis. A household survey was conducted among 222 households in Kiambu County, Kenya. Results revealed that membership in waste management groups, access to recycling information, and perception of diversification of recycled products significantly and positively influenced the adoption of BSF. Households adopting BSF recycle 3-fold higher volumes of organic waste annually and generate 5-fold higher return on investment than those using conventional composting. Our findings reveal that BSF is a profitable and potentially economically efficient technology for managing organic waste and promoting greener economies. These results should inform research and policy decisions aimed at developing and promoting efficient waste management technologies as well as integrating frass fertilizer production into smallholder cropping systems.