Performance of black soldier fly inoculation on succession of bacteria and organic matter transformation during organic manure composting

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Abstract

This study aim was to investigate the influence of black soldier fly larvae (BSFL) *Hermetia illucens* L. (Diptera: Stratiomyidae) on pathogenic bacteria (PB) survival in the chicken manure (CM), pig manure (PM), and cow manure (COM) compost. Three kinds of manure [chicken (T2), pig (T4) and cow (T6)] were inoculated with BSFL (1.2:7 ratio on fresh weight basis) and without BSFL (T1, T3, T5 and T7) was used as control and experiment lasted for 9 days. The results indicated that BSFL amendment 90-93% of PB abundances (RAs) was significantly mitigate in CM and COM (T2 and T6), and 86-88% in PM compost. However, relatively higher alive of PB was observed in the T4 and T8 treatments. Most of the PB pertain to *Proteobacteria*, *Firmicutes*, *Actinobacteria* and *Bacteroidetes* phylum and their community composition varied from phylum to species levels among the all treatments. The PB composition was significantly altered by BSFL amendment and also important role play to enhance in compost quality. Interestingly, *Bacillus* and *Clostridium* were significantly very less abundant present in BSFL applied (i.e., T2, T4, T6 and T8) treatments, but considerably higher population of these bacterial genus and its associated species were identifies from control or without BSFL applied (T1, T3, T5 and T7) treatments. Overall, without BSFL blended-all three kinds of manure-composts have comparatively greater PB abundance than with BSFL applied treatments, as the PB species *Listeria_monocytogenes_FSL_R2-503*, *Staphylococcus_aureus_M0406*, *Bacillus_anthracis*, *Listeria_ivanovii*, *Staphylococcus_aureus_C0673*, *Salmonella Bacillus_cereus_VD115*, *Mycobacterium_tuberculosis_FJ05194 and Pseudomonas_aeruginosa* had relatively greater RAs, followed by *Bartonella_bacilliformis_Ver075; Bordetella_pertussis_2356847; Brucella_melitensis_ADMAS-G1; Klebsiella_pneumoniae_LCT-KP182* and *Corynebacterium_jeikeium_K411* respectively. Thus, CM composting with BSFL addition is efficient technology for the organic waste recycling and conversion of sanitized matured compost with significantly less RBs of PB.

Keywords: Black soldier fly; manure; composting; pathogenic bacteria; relative abundance.