



Tropentag, September 20-22, 2023, hybrid conference
“Competing pathways for equitable food systems transformation:
Trade-offs and synergies”

Potential of insect frass as a bio-organic fertiliser from super worm (*Zophobas morio*) and meal worm (*Tenebrio molitor*)

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Abstract

Insect frasses have literally been studied as a bio-organic fertiliser as it contains high plant nutritional values that may benefits for plant growth and yield. This study aims at comparing physical, chemical and microbiological properties of super worm (*Zophobas morio*) frass and mealworm (*Tenebrio molitor*) frass as potential bio-organic fertilisers. Insect frasses were received from the insect farm in the north of Thailand where the food source for insect is mainly from wheat bran. This study was conducted at Faculty of Agriculture, Chiang Mai University, Thailand. By using a Scanning Electron Microscope (SEM) with energy dispersive X-ray spectroscopy (EDS), the shape and size of frasses, as well as their chemical compositions by weight, were analyzed. In addition, the screening and isolation of microorganisms were analysed by serial dilution and plate count. The results demonstrated that super worm frass contains high amount of macronutrient including nitrogen (4%), phosphorus (6.64%), and potassium (1.47%) while mealworm frass contains nitrogen (5.09%), phosphorus (6.88%), and potassium (2.29%). Not only physico-chemical properties of frasses revealed a potential characteristic as bio-organic-fertiliser, but microorganisms screening and isolation results also found many microbial isolates that can promote plant growth (PGPs). Super worm frass can be isolated for 58 isolates including bacteria 22 isolates, fungi 1 isolate, actinomyces 13 isolates, and yeast 1 isolate and mealworm frass can be isolated for 21 isolates including bacteria 11 isolates, fungi 4 isolates, and actinomyces 6 isolates. Our findings indicated that the frasses produced by these insects, due to its nutritional content and associated microbiota, can be potentially used as a bio-organic fertiliser in organic farming.

Keywords: Insect frasses, microorganisms, plant growth promoters (PGPs)