

Study of the oviposition response of black soldier fly (BSF) in the presence of banana and pupal remains

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Abstract

Black soldier fly (BSF), *Hermetia illucens*, is an important beneficial insect. Numerous studies have been conducted to understand the oviposition behavior and preferences of BSF. This paper reports the effects of decomposition level of food and presence of pupal remnants on the oviposition responses of BSF. Cages comprising of four oviposition sites, housed with five male and female BSF were prepared. Gravid females were provided with equal opportunities to oviposit in two sites with ripened banana (mildly ripened (MR) or over-ripened banana (AR)) and two other sites with fresh banana (OV). Three replicates in clockwise replication design were set up. The presence of pupal cases in high, medium and low abundance were studied. The number of eggs deposited at different sites were counted and expressed in percentage and oviposition attraction index (OAI). Gravid BSF females showed greater attraction to sites with over-ripened banana likely associating with the odor. BSF females also exhibited a preference for egg laying at sites with less pupae cases. Sites with the most abundance pupae cases were far less enticing as the pupae cases may deter the ovipositing BSF. The findings of this study is important for development of effective egg trapping and collection strategies in BSF farming.

Keywords: *Hermetia illucens*, Stages of ripening, Odor, Pupal case, Oviposition

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Introduction

Insects are natural diet for fish and poultry (van Huis et al., 2013). They have high feed conversion efficiency and are rich source of protein, fat, vitamin and minerals (Rumpold and Schlüter, 2013). These characteristics are also typical to black soldier fly (BSF), *Hermetia illucens* (Diptera: Stratiomyidae). BSF is a valuable source for biodiesel production due to its high lipid content (Wang and Shelomi, 2017). According to previous study, the amount of protein

and fat stored in BSF larvae can be as high as 35-45% on dry matter basis (Newton et al., 2005). The crude protein and fat level reported in BSF pre-pupae was in the range of 38% – 46% and 21% – 48%, respectively (Oonincx et al., 2015; Driemeyer, 2016). BSF is also used as an effective biological control agent to reduce the oviposition of house flies (Tomberlin and Sheppard, 2002).

BSF has been commonly used for bioconversion of organic wastes (Nguyen et al., 2015; Badenhorst, 2017; Nyakeri et al., 2017a), the larvae can consume a

