Diagram

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The larval stage lasts about 22 days, of which the postfeeding (prepupal) stage lasts around 7 days.

An adult female lays between 206 and 639 eggs at a time. These eggs are typically deposited in crevices or on surfaces above or adjacent to decaying matter such as manure or compost and hatch in about 4 days

**Flies Larva feed requirement**

H. illucens are known to successfully recycle different types of organic waste streams such as: fruit, vegetable and kitchen waste (Nguyen et al., 2015); municipal organic waste (Diener et al., 2011); cow manure and fish offal (St-Hilaire et al., 2007); human faeces (Lalander et al., 2015); and swine manure (Newton et al., 2005).

The larval live history traits and larval food intake can be highly influenced by a series of factors, such as temperature, humidity, and diet quality. Tomberlin et al. (2009) showed that temperature influences the development of the larvae and Tschimer and Simon (2015) found that larval yield and food intake were influenced by different diets.

However, high fat contents in feed of the larvae (20-36% DM crude fat) could be detrimental for both larval and adult survival (Nguyen et al., 2013, 2015).

On the other hand, there are also physical factors influencing insect performance. For example, if the layer of food substrate is too thick, such as meat meal, swine meat, fish or liver, this reduces larval food intake resulting in lower survival and longer development (Gobbi, 2012; Gobbi et al., 2013; Nguyen et al., 2013).

Kalová and Borkovcová (2013) found that BSF larvae fed organic waste with high moisture content (>90%), survived, but had lower performance.

Black soldier fly pre-puppae contain approximately 42% protein (37%-65% based on allaboutfeed website) and 35% fat (shepherd et al)

larval grow best in densities between 0.1 and 2.5 larvae/cm2. Assuming that the substrate layer is around 1-2 cm thick, an average density of 1.4 larvae per cm2 can be calculated (min. 0.1 and max. 3.33 larvae/cm2). Sheppard et al. (2002) suggest a density of 2.5 larvae per cm2 of surface area for BSF fed chicken feed, in order to obtain an adequate growth. Banks et al. (2014) recorded similar larval developmental time (28-30 days)

One challenge is the space required for aerial mating. Mating and oviposition has been reliably achieved in greenhouses with 2 x 2 x 4 m screen cages [48] and 1.5 x 1.5 x 3 m nylon cages in 7 x 9 x5 m greenhouses with sunlight and adequate space for adults to mate in the air (Tomberlin, J.K.; Sheppard, D.C. Factors influencing mating and oviposition of black soldier flies (diptera: Stratiomyidae) in a colony. J. Entomol. Sci. 2002, 37, 345–352) , yet egg production has been recorded in cages as small as 27 x 27 x 27 cm

Example of application of black soldier fly

The remoteness of many islands and their communities would justify household- or community-level BSF composting, although this will depend on whether locals are willing to put in the extra effort to produce flies relative to simply burning or burying waste. a medium-sized BSF bioconverters could also be used for large schools, airports, and detention facilities

Let’s say that tourism is a good example in this study case, the use of medium-scale BSF facilities to process the wastes of individual resorts, reducing the costs associated with transporting waste to landfills. The downside is that resorts likely do not have any use for the BSF themselves, nor would their profit margins be greatly impacted by selling BSF products

A large-scale, centralized BSF composting facility is theoretically feasible, but the main limitation is the sorting, collection, and transportation of green waste to the facility and subsequent transportation of BSF products out.

Challenge to address?

- How can we ensure to maintain stable waste stream? There is a cost to procure and transport them, does the profit can cover all the transportation fee? Is it possible to collect specific (perishable) waste streams in an efficient way?

- minor problem, variability of biomass leading to inconsistent nutrient for the larvae which might affect the end result

- How can we develop a collection, processing, and distribution network? Is it a local initiative? Is there sufficient scale to make the reuse feasible from a business perspective? How is the waste transported?

- How can we harness power of data, sensors, data analytics, and machine learning and artificial intelligence to provide solution

In my opinion, choose specific waste stream we like to address and how we plan to collect it and specific application what to do with the ready-processed larvae. If we plan to making application, how we plan to monetize it