



**SESSION IX**

**INSECTS FOR BIOCONVERSION**

**Insect-mediated bioconversion for organic waste valorization: understanding and exploiting the digestion capability of *Hermetia illucens* larvae**

Marco Bonelli<sup>1</sup>, Daniele Bruno<sup>2</sup>, Maria Giovanna Pellegrino<sup>1</sup>, Maria Carmen Valoroso<sup>1</sup>, Davis Roma<sup>1</sup>, Aurora Montali<sup>2</sup>, Gianluca Molla<sup>2</sup>, Lorendano Pollegioni<sup>2</sup>, Maurizio Stefano Galimberti<sup>3</sup>, Silvia Caccia<sup>1</sup>, Gianluca Tettamanti<sup>2</sup>, Morena Casartelli<sup>1</sup>

<sup>1</sup> University of Milan, Italy; <sup>2</sup> University of Insubria, Italy; <sup>3</sup> Polytechnic University of Milan, Italy

Insect-mediated bioconversion of organic waste and by-products from agri-food supply chains can represent an innovative strategy to valorize low-value biomass and obtain sustainable bioproducts according to circular economy criteria. To this purpose, one of the most promising agents for bioconversion is the Black Soldier Fly (BSF) (*Hermetia illucens*; Diptera: Stratiomyidae), whose saprophagous larvae can grow on a wide variety of low-quality organic matter. In particular, we are investigating the biotransformation efficiency of the Organic Fraction of Municipal Solid Waste (OFMSW) by BSF larvae, with the final aim to obtain biobased materials with low environmental impact and high technological value, such as bioplastics and biodiesel (from insect proteins and lipids respectively).

As the midgut plays a fundamental role in the insect-mediated bioconversion processes, we evaluated the digestion capability of BSF larvae reared on two substrates with different nutritional content that mimic the composition of OFMSW. Our results showed that the larvae can compensate variations in nutrient composition of the substrate by post-ingestion responses, through the regulation of gene expression and activity of digestive enzymes. Indeed, despite differences in diet composition, we observed similar larval performances, and similar larval and pupal chemical compositions.

To evaluate in depth the lipid profile we performed a lipidomic analysis on larvae and pupae reared on the two diets. The results indicated that the rearing substrate composition affects lipid composition in both developmental stages. These data set the stage to evaluate how the developmental stage and the rearing substrate affect BSF metabolism and lipid composition, and can also be useful to assess if the lipids from *Hermetia illucens* reared on OFMSW are suitable for biodiesel production.

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**PAROLE CHIAVE:** *Hermetia illucens*; insect-mediated bioconversion; midgut; lipidomics.

**ORAL PRESENTATION**