

## **OPTIMIZING INDUSTRIAL PRODUCTION OF *HERMETIA ILLUCENS* LARVAE**

Nayak, AU<sup>1,2</sup>, Rühl, M<sup>1,2</sup>

<sup>1</sup> Institute of food chemistry and food biotechnology, Heinrich-Buff-Ring 17–19, 35392 Giessen

<sup>2</sup> Fraunhofer Institute for Molecular Biology and Applied Ecology (IME), Ohlebergsweg 12, 35392 Giessen

World population growth and increased incomes have resulted in a higher demand for protein, usually provided by milk and meat, that is greater than its production rate. To meet this growing demand, alternative protein sources and sustainable production systems for animal proteins have been identified. As a consequence of this effort the number of insect-protein producing industries for food and feed is rising. However, these industries face many challenges that are the background of recent scientific projects. The black soldier fly, *Hermetia illucens* (BSF; Diptera: Stratiomyidae), represents one of the potential insects that can assist as feed in a sustainable production of e.g. fish or shrimps in aquaculture. It is valued for its high quality protein, fat, and its ability to thrive on a variety of bio-wastes. However, it is still necessary to optimize insect production, using a step-by-step approach. To this end, the first experiments in this study are planned with feed trials. Plant-based by-products would be used to study BSF larvae performance: survival percentage, growth rate, total yield, waste reduction index, amino acid and fatty acid concentration. Individual experiments are planned to optimize feed particle size, substrate composition, density of larvae per box, feeding depth, and feeding rate. Chicken feed would act as the positive control diet for all the experiments, and further, larvae reared on different substrates would be analyzed for anti-microbial peptides. In addition, insect frass would be investigated for its chemical and physical properties to be potentially used as bio-fertilizer. At the end of the study, as a validation step, an industrial level feed trial would be conducted to check laboratory optimized diets. Thus, the project focuses on increasing the quality and quantity of larval yield, finding other uses for insect products and by-products, while taking into account the concept of circular economy.