Investigating the role of amylases from Hermetia illucens larvae and their substrate in starch digestion

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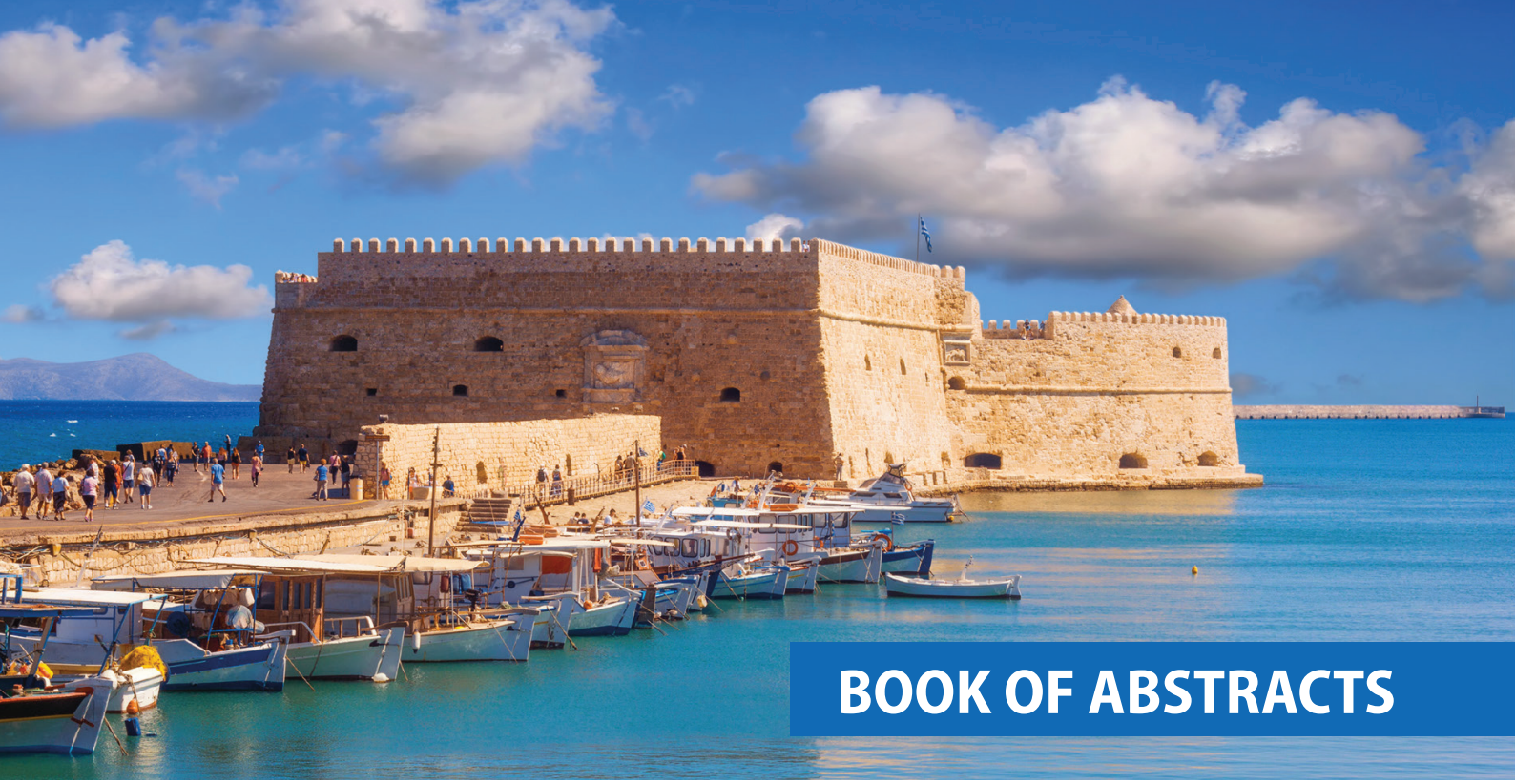

BOOK OF ABSTRACTS

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biotransformation efficiency of the Organic Fraction of Municipal Solid Waste (OFMSW) by BSF larvae with the final aim to obtain biobased materials, such as bioplastics and biodiesel from insect proteins and lipids, respectively. In particular, in this study we evaluated the growth performance of BSF larvae and their efficiency in reducing two substrates with different nutritional content that mimic the composition of OFMSW. Although the growth rate of larvae reared on both substrates was comparable, differences in the reduction of waste and the conversion efficiency into insect body mass were observed. As the midgut plays a fundamental role in the insect-mediated bioconversion processes, we evaluated the digestion capability of BSF larvae reared on the two substrates. 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 growth performance and chemical composition of the insect.

Keywords: *Hermetia illucens* larvae, waste bioconversion indexes, midgut physiology, digestive enzymes

OC063. Investigating the role of amylases from *Hermetia illucens* larvae and their substrate in starch digestion

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Black soldier fly larvae (BSFL; *Hermetia illucens*) are increasingly studied for their ability to transform organic substrates into body proteins and lipids that can be used for animal or human nutrition. Carbohydrate content of their diet has been associated with larval growth and fat body content, and it has recently been reported that BSFL had high starch digestion efficiency and that their midgut presented high amylase activity. This study investigated the effect of starch content and type on BSFL amylase activity and starch Estimated Digestibility (ED). BSFL were fed various plant-based diets with different starch content. Both larvae and substrates were sampled after feeding periods of 4, 7 and 11 days, along with initial BSFL and diets. Each sample was ground in phosphate-buffered saline with protease inhibitor and centrifuged to collect water phase. Amylase activity was assessed in each solution via spectrophotometry using soluble starch at pH 6.5 and dinitrosalicylic acid. Values were reported as enzymatic activity units per gram of total soluble protein measured according to Bradford. Western-blot was used to detect BSFL amylases in substrate samples that could contain enzymes from plant material, microbes, or larvae. This approach provides insight into larval amylase regulation mechanisms and the role of extra-oral digestion of starch in BSFL conversion systems.

Keywords: insect nutrition, extra-oral digestion, alternative protein, insects as feed, Diptera, digestive enzymes