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## **Insect-mediated bioconversion: from organic waste to biobased materials. Conversion efficiency and protein valorization**

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One of the most important challenges that must be addressed in coming years is the transition from linear to circular economy models. The valorization of waste plays a key role in this scenario. In particular, the reduction and bioconversion of organic waste by using insects can mitigate problems related to waste management and, at the same time, generate valuable biobased products.

To this aim, the goal of the RICH (Turning Rubbish Into biobased materials: a sustainable CHain for the full valorization of organic waste) project is to develop an innovative circular supply chain to bioconvert the organic fraction of municipal solid waste (OFMSW) into biobased materials as bioplastics, characterized by high technological value and environmentally friendly, by using the larvae of the black soldier fly (BSF), *Hermetia illucens*.

The results obtained so far demonstrate the efficacy of BSF larvae to reduce two different OFMSW, which differ in nutritional composition, as indicated by the bioconversion indexes. In particular, although differences in the efficiency of waste reduction and conversion of the ingested food were identified, no difference was recorded in the larval growth rate. In addition, the comparison of the nutritional composition of larvae and pupae reared on the two substrates revealed a similar amount of proteins and lipids. Protein extracts obtained from both developmental stages were biochemically characterized and used to produce free-standing and flexible biofilms, featured by thermal stability and high quality.

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