POR FESR EMILIA-ROMAGNA 2014/2020
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ValoriBio

VALORIZATION OF ORGANIC WASTE USING INSECTS TO OBTAIN BIOMATERIALS FOR AGRICULTURAL PURPOSES

POR FESR 2014 – 2020 – Axis 1 Research and Innovation

Using insects, the project aims to obtain added value from the waste of the zootechnical value chain (manure) as well as from other organic waste sources, to produce biomaterials that can be included in the agricultural productive cycle, in view of the overall sustainability of the technological process.

Problem: Valorization of organic waste

Zootechnical Value Chain Waste

Amongst zootechnical companies, the avicultural ones face a particularly relevant problem – disposing of poultry manure in an efficient and advantageous manner.

Other organic waste sources

Currently, the disposal of **green waste** (clippings, trimmings) in the **selective collection of waste** is costly (given the need to transfer this material to the appropriate composting plant) and not particularly efficient (green waste is transformed into a compost of limited economic value).

Solution: Black Soldier Fly

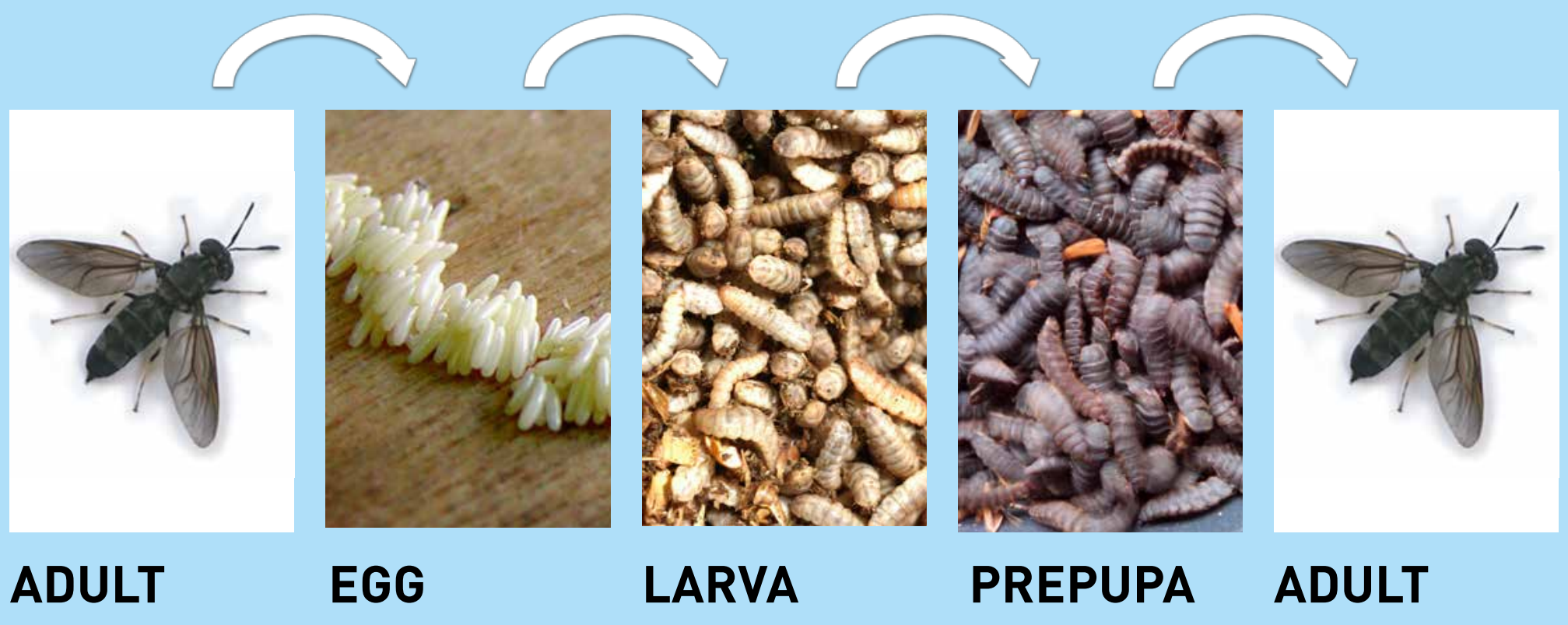
Hermetia illucens (Black soldier fly)

The larvae of the black soldier fly are capable of efficiently and rapidly converting large quantities of organc waste and zootechnical manure into protein-rich and fats-rich biomass

Main characteristics

This fly is not a pest: adults live a few days, they do not feed and do not transmit pathogens.
This species is already established in Europe. Each female is capable of laying 500 eggs.

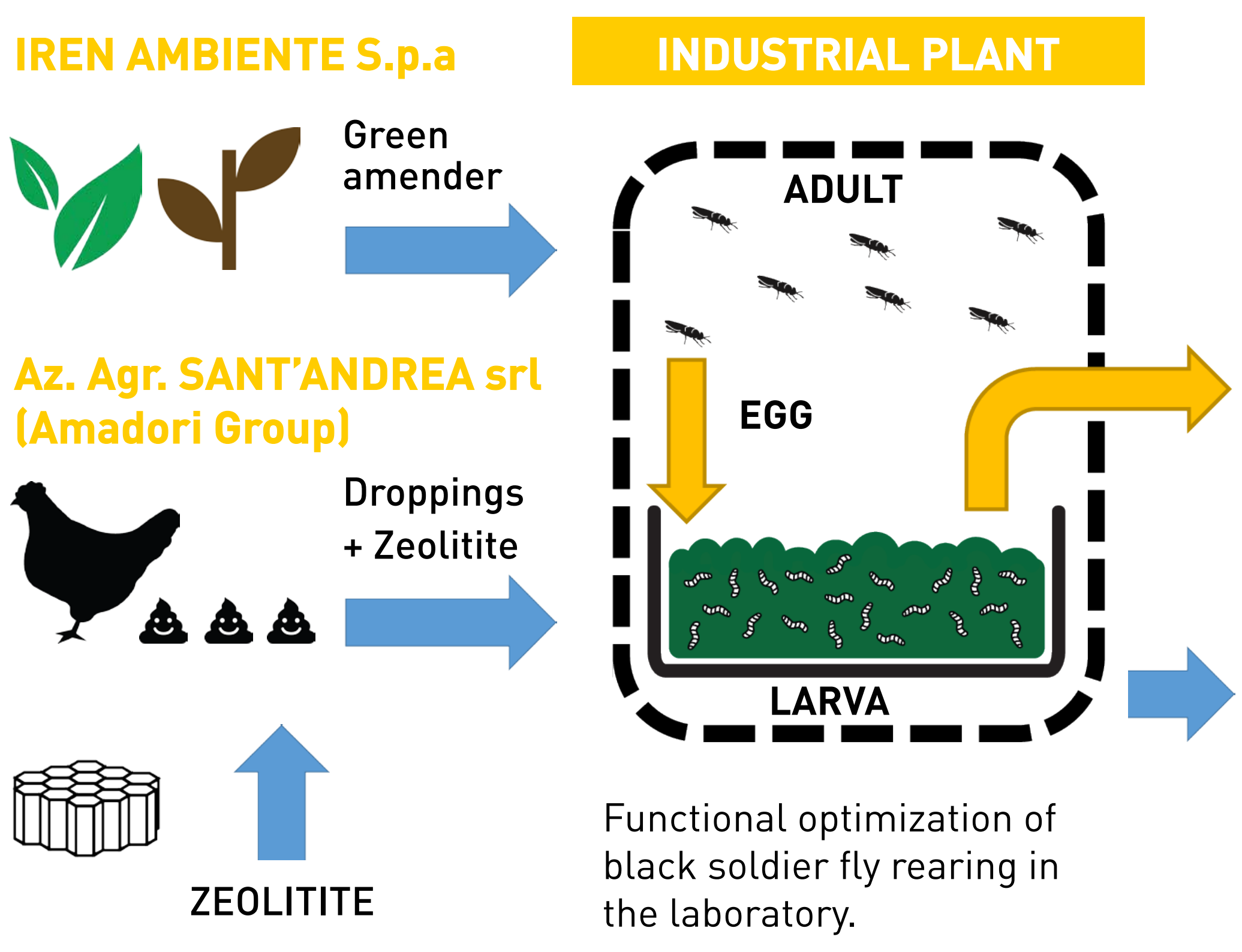
Life Cycle



Project

1

Functional optimization of black soldier fly rearing on organic substrates



Addition of zeolitite in the zootechnical litter. **Zeolitite** is a natural rock recoverable from quarry waste and is capable of capturing ammonia nitrogen, thus reducing the unpleasant emissions of poultry manure.

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Functional optimization of black soldier fly rearing in the laboratory.

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Creation of an **industrial pilot plant** for the rearing of black soldier flies on different organic substrates, capable of producing prepupae and high-quality compost.

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Prepupae

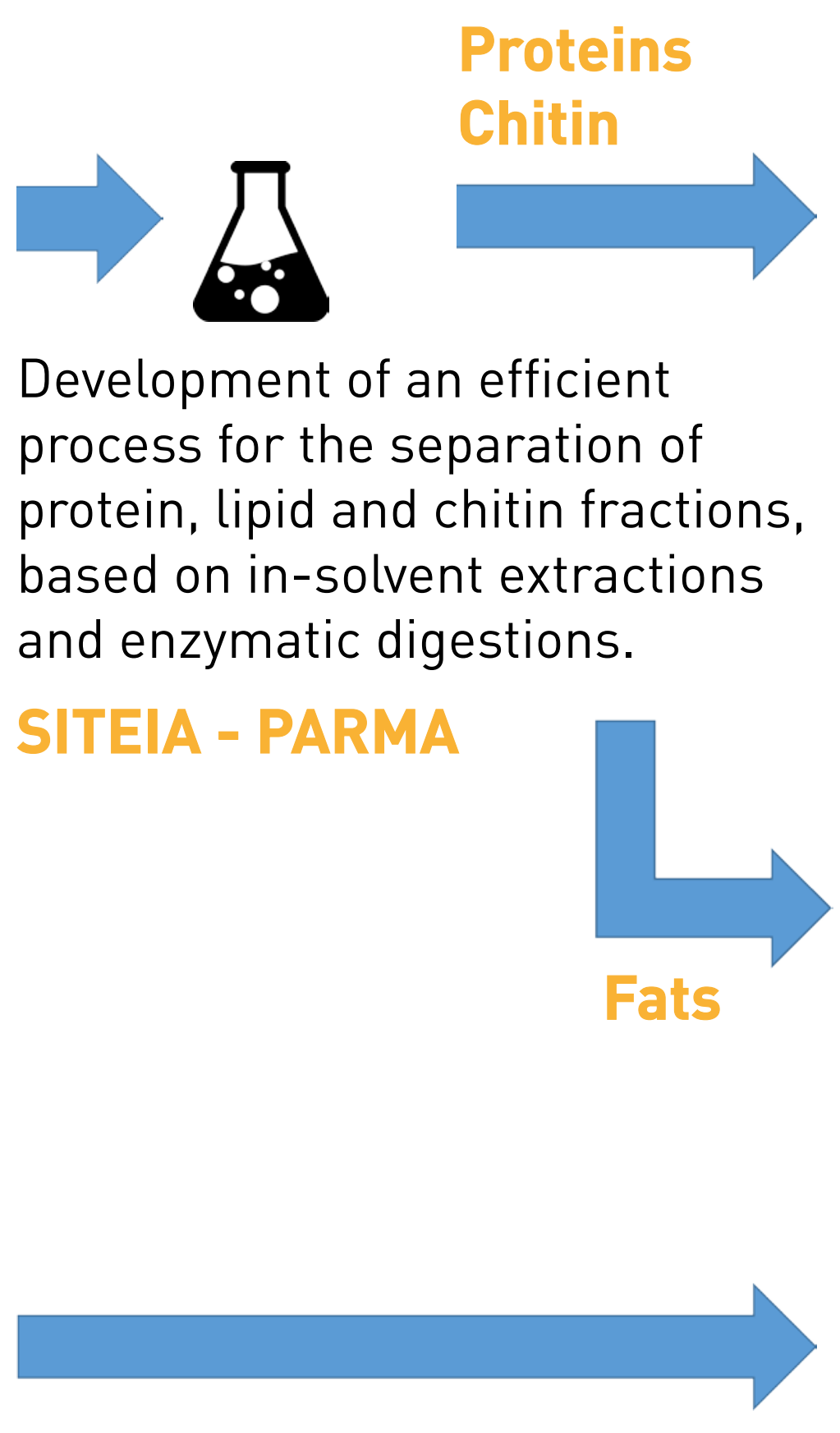
The prepupae are mainly composed of proteins (40%), fats (30%) and chitin.

High performance compost + zeolite

The black soldier fly larvae can transform organic waste into high-quality compost. The zeolitite scattered within the compost is furthermore capable of releasing, in time, the ammonia nitrogen captured in the zootechnic litter.

2

Isolation and characterization of macromolecules from the soldier fly prepupas.



Development of an efficient process for the separation of protein, lipid and chitin fractions, based on in-solvent extractions and enzymatic digestions.

SITEIA - PARMA

3

Isolation and characterization of macromolecules from the prepupae of the black soldier fly

Bioplastics

Evaluation of the feasibility of employing proteins, fats and chitin extracted from BSF prepupae in the formulation and obtainment of bioplastics. The formulation will employ the relevant additives to improve the chemical and physical properties of the obtained materials.

INTERMECH MO.RE

Bio-combustibles

Evaluation of the feasibility of employing fats in the production of BioDiesel.

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Agronomic objectives

Quality evaluation of the produced compost: quantity of nutritional elements, C/N ratio and presence/absence of microorganisms.

4

Sustainability and feasibility evaluation of processes and products (LCA, legal aspects)

The environmental and economic sustainability of the different project phases will be evaluated through a careful LCA (Lyfe Cycle Analysis) and LCC (Life Cycle Cost) analysis. The legal feasibility analysis of the described processes will clarify the legal and normative aspects of the alternative employment of organic waste to give rise to innovative industrial prospects.

INTERMECH MO.RE   BIOGEST-SITEIA

5

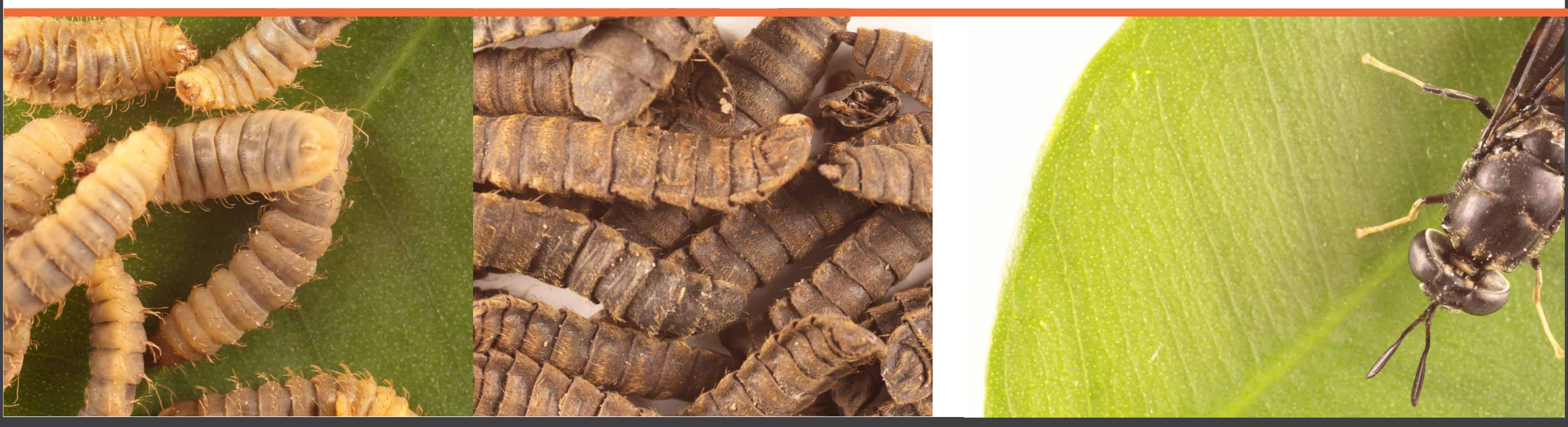
Activities for the diffusion and dissemination of the results

REI - REGGIO EMILIA INNOVAZIONE - Scarl

The activities will be carried out in collaboration with **ILO** (Industrial Liaison Office) UNIMORE

Circular Economy

The project's objective is to create an actual circular economy in the agricultural sector, wherein, thanks to black soldier flies, zootechnical value chain waste (manure) and other organic waste sources are transformed into innovative bioplastics with specific properties. These bioplastics, mainly employable in the agricultural sector (e.g. sheet mulching and biodegradable vases), aside from carrying out their primary function, act as a slow-release fertilizer, releasing nitrogen during their decomposition.



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