

LEADING A REVOLUTION IN BIOWASTE RECYCLING

Insect rearing: from HORECA waste to valuable new raw materials Andrea Antonelli (UNIMORE) Giacomo Benassi (KOUR ENERGY)

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> Challenge - Need

most preferable option

last preferable option

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> Solution



 Waste of raw materials, ingredients and products arising is reduced — measured in overall reduction in waste

Re-use

- Redistribution to people
- Sent to animal feed

Recycle

- · Waste sent to anaerobic digestion
- Waste composted

Recover other value

Incineration of waste with energy recovery

Dispose

- Waste incinerated without energy recovery
- · Waste sent to landfill
- Waste disposed of in sewerage system

The waste hierarchy Waste Framework Directive (WFD;2008/98/EC) **ORGANIC WASTE INSECTS PROTEINS, FAT** and CHITIN

> Objectives

General objective: to obtain high-value products from Black Soldier Fly reared on Retail Organic Materials and HORECA.



Plant implementation with an INPUT and an OUTPUT STAGE

NEW TRL 7 SCALIBUR PLANT

UNIMORE pilot plant for BSF mass rearing





> Insect rearing

Overall rearing performances after 2 full years using HORECA organic waste as feeding substrate

LARVAE PARAMETERS Larvae density - 5 larvae/cm² Quantity of feeding substrate/larvae - 0.75 g Average larvae weight - 0.162 g Production cycle - 12 days Substrate reduction - 80% FLIES PARAMETERS Concentrated period for egg collection (6 days) Fly density of 23000 flies/m³ Production 35-40 g eggs /cycle for 10000 flies

DIET PARAMETERS:

- no water added to the substrate
 - larvae fed only once per cycle

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> Pilot plant

Rearing chamber (open)

Nursery





Bioconverter



Features

- Simple and automatic
- Efficient
- Versatile and scalable

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Fractionation process



Features

- Compact but able to work when arge
- Continuous and efficient
- Versatile and scalab
- Solventless



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> Main results

- We have shown that HORECAs are an ideal substrate for the breeding of the black soldier fly.
- It is possible to scale-up the process to have constant and efficient production all year round.
- Larvae can be a valuable source of high quality proteins, fat, and chitin.

How the solution responds/fits market requirements

- Bioconversion period 10 days vs 20 for anaerobic digestion
- Production of complex compounds such as proteins, fats, and chitins.
- Simple plants and longer lifespan than high organic waste disposal plants.

> Future

- Application on organic waste management
- Use of larvae fractions for industrial, feed, and food applications
- Deep reflection on the existing legislation for its conscious and responsible modification

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