















# ENTOSAFE - Edible insects: From a sustainable food production to a food safety concern

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## **Context & Background**

Food deficiency and management of (food) wastes are two of the most daunting challenges that the world is facing.

Agriculture and supermarket leftovers (or other wastes) can be used as substrate to rear insects - Valuable solution to waste.

At the same time, organic

waste (insect frass) is

generated due to the

metabolic activity of the

larvae/insects in the rearing

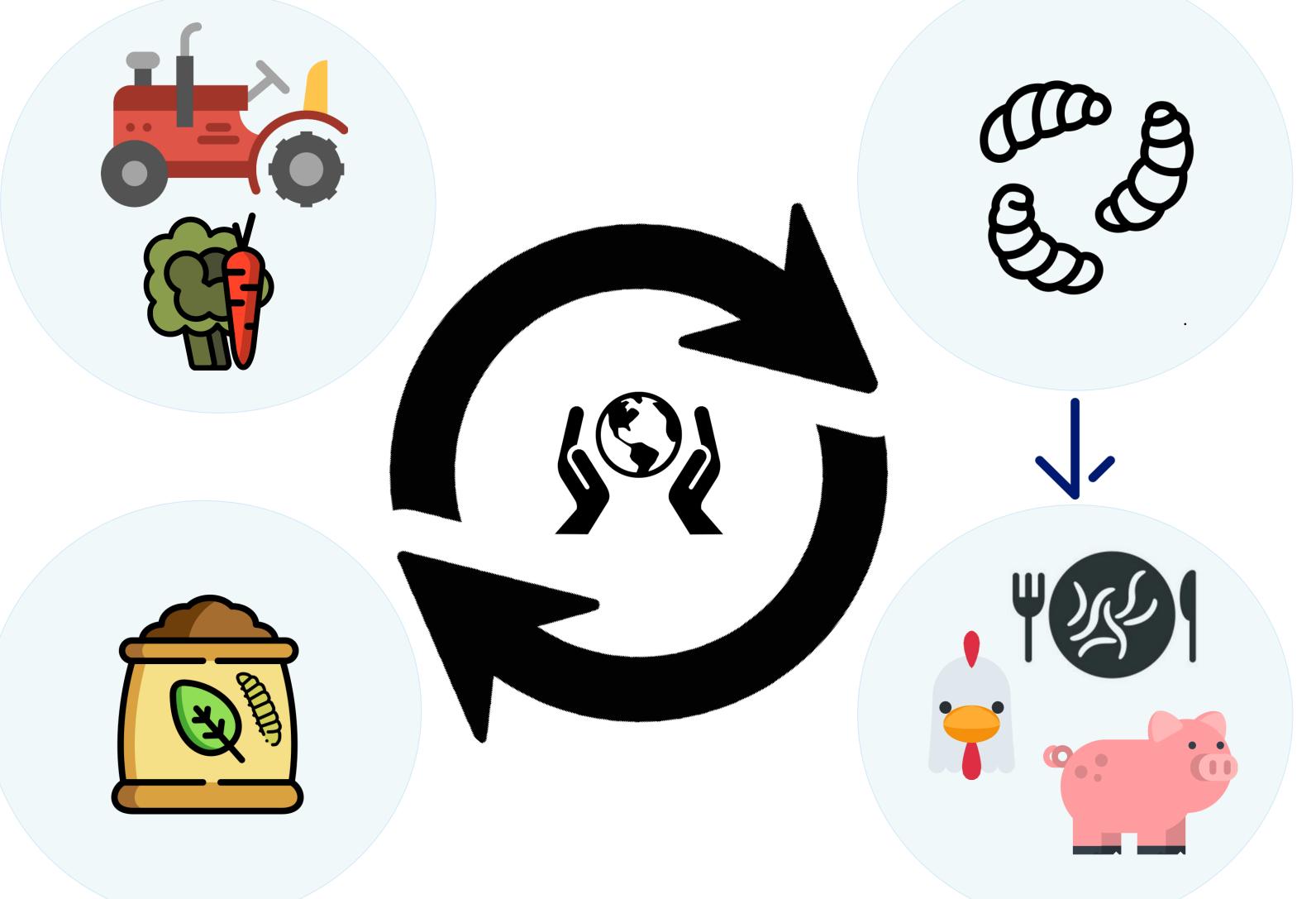
facility, which

consists of valuable

biomass with high potential

for agriculture and used as

organic fertilizer.



Insects have a high content of nutrients and protein, and their use as food/feed has great environmental advantages over conventional food/feed by introducing new sources of nutrients with low environmental impact.

Insects reared in waste substrate can be used as food and feed source. However,

Contaminants can be uptaken by insects through the substrate they feed on, entering the farming cycle, and, consequently, the food chain.

<u>Understanding these</u> compounds' pathways and their effects on insects is crucial.

#### Goals

Integrating the food safety with environmental sustainability aspects of edible insect farming, the project ENTOSAFE is committed to:

- Provide knowledge on the (bio)accumulation and transfer of potential contaminants in insects farmed in rearing facilities.
- ii) Evaluate the effects of organic fertilizer produced on the (bio)digestion of the substrate on soil functions, namely water and nutrient retention, nutrient cycling, and plant performance in the amended soil.

#### **ENTOSAFE** aims to reply to:

- How insects bioaccumulate chemical substances?
- ✓ Are insects reared in waste safe to be used as food and feed? How efficiently are substances excreted by insects?
- Does insect' organic fertilizer affect amended soil properties and plant growth?

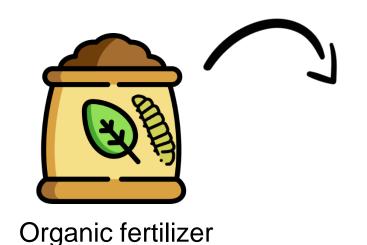
# Approach

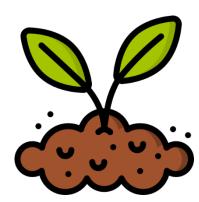
## **Food safety concerns** Metals Tenebrio molitor Mycotoxins Hermetia illucens **PAHs** Pharmaceuticals

# **Knowledge and Data**

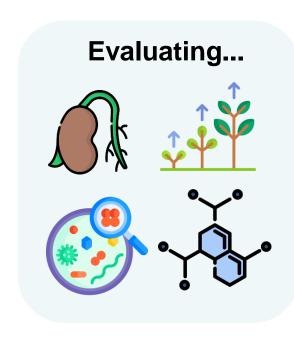
Toxicokinetic experiments and modelling: Uptake and elimination phases Uptake and elimination rate constants Bioaccumulation factors

## **Environmental sustainability**





Seed germination assays Complexity Plant pot tests Greenhouse experiment



# **Expected impact**

- Inform regulatory authorities on accumulation of different substances into edible insects publicly available database (e.g., species, type of substrate, type of exposure, substance exposure concentration, substance into the organism, depuration).
- Define future research regarding the accumulation of contaminants into edible insects.
- Contribute to possible redefinition of regulatory limits of different substances in substrates (i)used by insects – **legislation improvements**.
- Contribute to the applicability of organic fertilizers (from the biodigestion of organic waste by (i)insects) in crops – (partially) substitution of NPK fertilizers.
- Contribute to the development of insects rearing sector supported by Ingredient

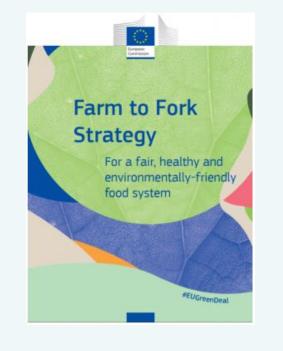
## Framework of the project for the United Nations Sustainable Development Goals











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