GO DIIANA: Development of a circular and sustainable value chain based on the Inclusion of Insects in Foods based on Alternative Proteins

Summary

The **GO DIIANA,** project entitled "Development of a circular and sustainable value chain based on the integration of insects in foods based on alternative proteins", **focuses on the use of insect protein as an alternative protein source for the development of innovative products for human nutrition** optimising the transformation processes of the larvae of *Tenebrio molitor* (TM), in order to obtain food ingredients with improved characteristics and properties that meet the requirements of the final food matrix (nutritional profile, sensory properties and functional properties). The project will establish an integrated value chain for the development of human food products based on locally produced insect protein, also seeking added value for access to export markets that value traceability, production control, sustainability and environmental viability of the new products. As a final result, the project will provide a solution that increases the protein offer and broadens consumer choice through the development of new insect protein-based foods.

Objectives

The objective of the GO DIIANA project is to promote the use of insect protein as an alternative protein source for the development of innovative products for human consumption. The specific objectives are set out below:

- Objective 1. Establish the desirable characteristics and properties according to nutritional, techno-functional and organoleptic criteria of the insect-derived ingredient to be developed.
- Objective 2. Develop ingredients derived from TM that are highly competitive and suitable as a food ingredient by means of larvae transformation processes (dehydration, defatting, enzymatic hydrolysis, coupage) specifically established to improve the characteristics, functional and organoleptic properties of the ingredient obtained.
- Objective 3. Determine the conditions for incorporating insect protein in paste formulations suitable for various final applications, taking into account its combination with other plant-based proteins, as well as with commercial adjuvants.
- Objective 4. Obtain and validate prototypes of innovative insect protein products (nuggets, meatballs, sausages and burgers) validated in terms of food safety, sensory and organoleptic quality.
- Objective 5. Identify the technical, economic and environmental feasibility of the manufacture of new products.

Description of the actions carried out in the project

The project is structured across 6 activities, 4 technical activities (activities 1-4), a dissemination activity (activity 5) and a project coordination activity (activity 6).
The approach of the technical activities is briefly described below:
Activity 1 "Technological study of flours", includes on the one hand the study of the characteristics of TM commercial flours and their suitability for use in the food products to be developed in the project, and on the other, the search for emulsifiers and coadjuvants that will be necessary to obtain the desired texture in the final product and used in subsequent tasks. At the same time, the physico-chemical characterisation and analysis of the techno-functional properties of the flour under study is carried out.
Activity 2 "Study for the improvement of the techno-functional properties of flour and the obtaining of ingredientsderived from TM" includes the evaluation of different TM biomass processing methodologies, as well as the formulation of flour with coadjuvants, studying their effect on the characteristics and

properties (nutritional profile, palatability and functional properties) of the products obtained, in order to develop TM derivatives (flour and hydrolysates) with competitive advantages in their application as a food ingredient.
Activity 3 "Development of prototypes", focuses on obtaining prototypes of different food products that include TM flour in their formulation. Based on the results of activity 2, the production of the selected TM-derived ingredient is scaled up. With this ingredient, the formulation of the pastes for different applications is established: nuggets, sausages, meatballs and burgers to end up with a portfolio of four high-quality insect protein meat alternatives.
Activity 4 "Validation of prototypes", includes the validation of the prototypes obtained in activity 3 both at nutritional and sensory level, obtaining relevant information on the overall acceptance of consumers and guaranteeing food safety throughout the whole process chain. In parallel, this activity analyses the technical, economic and environmental feasibility of the process.

Final results and practical recommendations

- Knowledge of the minimum requirements that TM-derived ingredients must meet in order to be competitive in the market and to show a significant improvement.
- Knowledge on the effect of different larval processing methodologies on the characteristics and properties of TM-derived ingredients.
- Selection of the TM-derived ingredient with the best nutritional and functional properties in order to scale up its production (obtaining at least 1 TM-derived prototype ingredient).
- Obtaining of 4 prototype products with desirable characteristics (quality, safety): nuggets, sausages, meatballs and hamburgers.

Leader of the Operational Group

ORGANISATION: ZYRCULAR PLANT, SL

Coordinator of the Operational Group

ORGANISATION: ACONDICIONAMIENTO TARRASENSE

Other members of the Operational Group (grant recipients)

ORGANISATION: IBERINSECT, SL

Subject area(s) of application

- ☐ Agricultural production system
- ☐ Agricultural practice
- ☐ Agricultural equipment and machinery
- ☐ Livestock farming and animal welfare
- ☐ Vegetable production and horticulture
- ☐ Landscape / Territorial management
- ☐ Pest and disease control
- ☐ Fertilisation and nutrient management
- ☐ Soil management
- ☐ Genetic resources
- ☐ Forestry
- ☐ Water management
- ☐ Climate and Climate Change
- ☐ Energy management
- ☐ Waste and by-product management

☐	Biodiversity and environmental management
☒	Food quality/processing and nutrition
☐	Supply chain, marketing and consumption
☐	Competitiveness and agricultural and forestry diversification
☐	General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
BARCELONA	Selva
BARCELONA	Anoia
TARRAGONA	Baix Camp

Dissemination of the project (publications, conferences, multimedia, etc.)

- Press release on the awarding of the grant and the start of the implementation of the GO DIIANA project on the

  Zyrcular Foods website. Link: https://zyrcularfoods.com/blog/

- Press release on the awarding of the grant and the start of the implementation of the GO DIIANA project on the Iberinsect website. Link: https://iberinsect.com/iberinsect-participa-en-un-grupo- operativo-que-promovera-productos-derivados-de-la-proteina-de-insecto-para-la-alimentacion- humana/

- Press release on the awarding of the grant and the start of the implementation of the GO DIIANA project on the Leitat project blog. Link: https://projects.leitat.org/projecte-go-diiana/

- Dissemination action on the awarding of the grant and the start of the implementation of the GO DIIANA project on the profile of the Leitat project blog on LinkedIn. Link: https://www.linkedin.com/feed/update/urn:li:activity:6991726254945103872

Project website

Link to the project coordinator's project blog where the project is described and where the technical progress and results achieved will be disseminated: https://projects.leitat.org/projecte-go-diiana/

More information on the project

PROJECT DATES	TOTAL BUDGET	
Starting date: July 2021	**Total budget:**	€134,220.17
	DACC funding:	€62,070.50
Current status: Under way	**EU funding:**	€46,825.11
	Own funding:	€25,324.56

With funding from:

Project funded through Operation 16.01.01 (Cooperation for Innovation) through the Catalan Rural Development Programme 2014-2022.

Order ARP/113/2021 of 20 May, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ACC/1660/2021, of 27 May, announcing the call for the grant.

Generalitat de Catalunya
Departament d'Agricultura, Ramaderia, Pesca i Alimentació

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