



Pilot Plant.

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The Pilot Plant is a very flexible structure that will allow us to carry out the validations required to create technology transfer models for our customers, as well as to experiment with new technologies that optimize our systems and generate new production systems with the following objectives:

- ✂ Start immediately a production of BSF that allows us to adapt and domesticate BSF to our industrial conditions.
- ✂ **Validation and reduction of waste:** the plant could validate different types of products and their mixtures from many different suppliers. This would greatly improve the calculations with respect to factory returns. It would also improve the relationships we have started with the suppliers of raw materials.
- ✂ **Showcase function:** it would be the first plant in Spain of this type, which would show the technology to the governmental authorities that need to understand this type of industry, our suppliers of raw material, potential clients or investors.
- ✂ **Realization of investigations:** rapid experiments would be carried out to optimize processes, develop new products and test some of our ideas in a short time. These investigations would allow us to participate in congresses, publication of papers, and in general create and maintain a scientific image that supports technology transfers.

Our short-term production goals are:

- ✂ Validation of waste for the projects that we have in progress
- ✂ Experimentation with various residues
- ✂ Optimization of the productive system

The initial objectives for the investigation are:

- ✂ Typology and extraction of fats
- ✂ Development of hydrolysates
- ✂ Generación de productos a partir de sustratos tóxicos
- ✂ Use in biodigestion
- ✂ Preprocessing of substrates to facilitate digestion
- ✂ Second generation reactors

The methods to make this plant profitable in the short term would be the following:

- ✂ Validation services for different types of waste
- ✂ Technology transfers
- ✂ Research projects
- ✂ Aid for innovation from regional, national and European governments
- ✂ Subsidies for the creation of new companies










Waste Valorization

In the valorization of the waste, the objective is the generation of diverse products with added value, starting from waste, and using insects as biofactories.

Among the residues that we have already valued to a greater or lesser extent, are those coming from the hotel industry, vegetable waste from horticultural crops, fruits from horticultural or fruit crops, by-products of the viticulture industry (skins and sediments from yeasts), from the beer industry (bagasse and yeast sediments), residues obtained in the production of cane sugar, molasses or beets, wastes from industrialization of olive oil or oils from seeds, etc.

In this valuation model, a waste, or a group of them, are previously characterized and either separately, or by designing a balanced mix of all of them, they are arranged in the production system. An established amount of larvae is available on this food, which in a cycle of only 12 days are able to increase its mass by 50 times.

This larval mass is subsequently processed to obtain products with added value:

-  Fresh or dried larvae that can be marketed as an additive in pet food
-  Flour with a protein content of 37-43% and a fat content of 32-36%, for use in animal feed
-  Defatted flour with a protein percentage of 51-63% and a fat content of 3-6%, for use in animal feed
-  Fat for use in animal feed
-  Compost, which results from the digestion of waste by the insect
-  Hydrolyzed larva, which would involve the commercialization of pure protein for inclusion in animal feed or for human consumption, regardless of the type of waste used
-  Other products that we are currently investigating through a national CIEN project: peptides with antibiotic capacity, chitosan, bio-active products, etc.

Currently the legislation allows the inclusion of this type of flours in animal feed, for pets and aquaculture, and for human consumption (previous registration), provided that residues are used mostly of plant origin. It is expected that by 2020 its inclusion in feed for monogastric animals will be allowed. The advantages of including this type of flours in animal feed have already been scientifically described.

The competitive advantage of this model is clear: we start from a waste with little value, and we obtain a battery of products with added value in a biological cycle of only 12 days, without producing contaminants or unwanted by-products.



Waste Reduction

In the waste volume reduction model, the approximation is similar to the valuation model, but underlining that the objective is the reduction of the waste taking advantage of the insect's conversion capacity, and not the generation of products with high added value.

In this model we would select waste as manure from livestock (with special interest in poultry manure), slurry, sludge from WWTP, digestates, etc. This waste poses a continuous problem not only for the producers of this waste, but also for the managers that must collect and process them.

In this process, after the characterization of the waste, these would be introduced into the system (mixed or not with other waste), and a certain amount of larvae would be established on the waste. In this case, the larval cycle would lengthen to about 20-27 days, since the nutritive content of these feeding substrates is much lower, and the obtained larval mass will also be lower.

Waste reduction is centered around two criteria and objectives.

-  Volume reduction: 60-70%
-  Reduction of pathogenic microbial load: ex.

$10^9 \rightarrow 10^2 *$

**It depends on the initial load and desired end. Final objective depends on whether it will give you further treatment.*