



centro tecnológico  
del calzado y del plástico

# Who we are

- CETEC is a Technological Institute promoted by the shoe manufacturing and plastic transformation industries as well as by the regional administration.
- CETEC operates as a non-profit organization whose goal is to perform R&D activities to generate scientific and technological knowledge.
- CETEC is made up of about 70 companies and is a meeting point for the development of R&D projects, information search, assistance to the obtaining of public fundings for the realization of projects, service of documentation and regulations, etc.
- At CETEC are working 12 qualified technicians, 2 are doctors, 3 graduates and 5 engineers.

# What we do

- The main activity of CETEC is to develop R&D projects and technology transfer to companies.
- We cover all phases of the process:
  - Project preparation
    - Writing and searching for solutions
    - Funding search
    - Projects submission
  - Project management
    - Technical tracking
    - Economic tracking
  - Technical and economic justification of the project



# What we do

- European projects

2016 2018	Biomulch: Integrated solution for innovative biodegradation control of agricultural plastic mulches	H2020-FTIPilot-2016
2014 2016	HTPush: Universal and compatible system for plumbing and heating	H2020 NMP-25-2014 SME-Instrument Phase 2
2012 2014	Greenavoid: Greenhouse solution to avoid film cover U.V. and sulphur degradation	FP7 Capacities Work Programme: Research for the benefit of SMEs
2012 2015	Degricol: Consumer-safe and thermally-stable bioplastic formulation with controlled biodegradation properties for agricultural and horticultural accessories	FP7 Capacities Work Programme: Research for the Benefit of SMEs Associations
2011 2013	ISAPACK: A Flexible Sustainable Active and Intelligent Packaging Technology Platform enabling enhanced shelf Life, Quality and Safety of Fresh Food Produce	Collaborative Project. KBBE.2011.2.3-03

# What we do

- National projects

2015 2016	Desarrollo de cubierta de invernadero activa	CDTI. Proyectos de Investigación y Desarrollo (PID). I+D Individual.
2013 2015	Sistema de inhibición de intrusión radicular en sistemas de riego localizado	CDTI. Proyectos de Investigación y Desarrollo (PID). I+D Individual.
2012 2014	Desarrollo de una cubierta plástica de invernadero con alta resistencia a la radiación solar y a la degradación química	CDTI. Proyectos de Investigación y Desarrollo (PID). I+D Individual.
2012 2013	Envase agrícola sostenible elaborado con excedentes de desechos vegetales	CDTI. Proyectos de Investigación y Desarrollo (PID). I+D Individual.

# Laboratory

**Chlorine analyzer and sulfur analyzer:** study of pesticide contamination in greenhouse covers, analysis in halogen-free plastics.



**Xenon test chamber:** assessment of the UV resistance of plastics.

**Nitrogen analyzer:** quantification of nitrogenous additives in plastic materials such as UV stabilizers.



**Infrared spectroscopy coupled to a microscope:** Identification of plastic materials in multilayer sheets, identification of additives in plastic materials, identification of plastic materials, determination of thermicity in agricultural greenhouse covers.

**UV-VIS spectroscopy with integrating sphere:** Optical properties in films, UV and VIS transmission, opacity, haze.



**X-ray fluorescence spectrometry (XRF):** Determination heavy metals content and other elements.

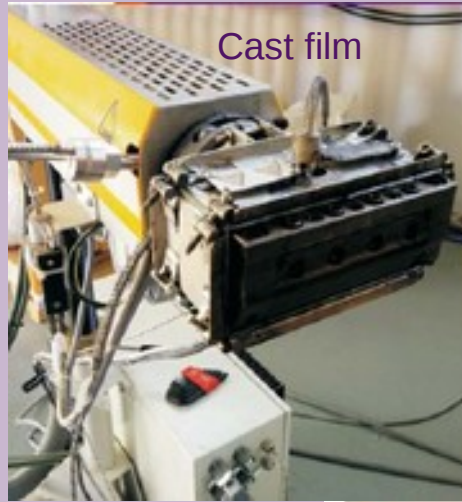




# Pilot plant



Blown film



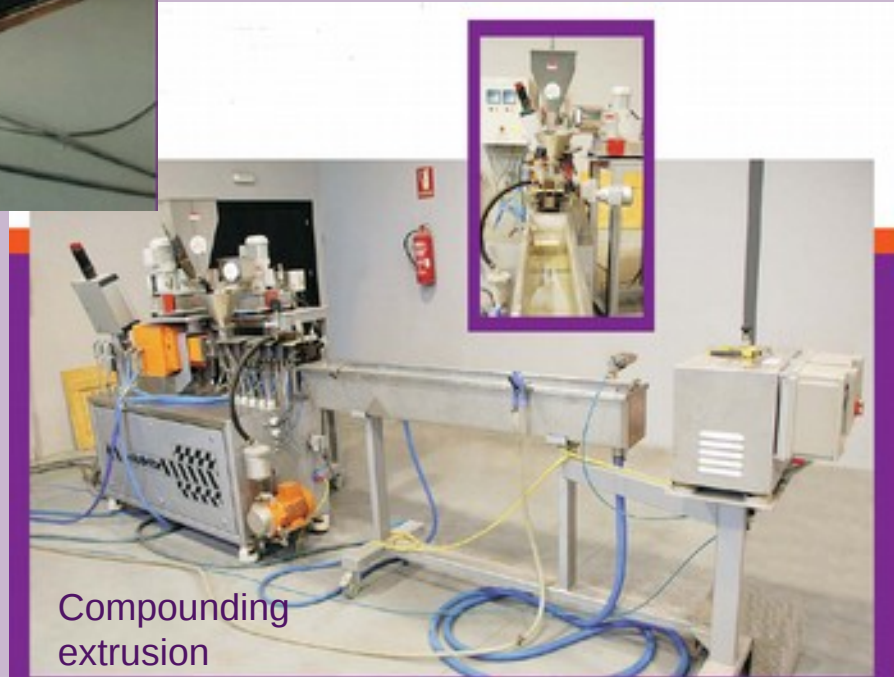
Cast film



Injection



Hot plate  
press



Compounding  
extrusion

# Where we are



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# BIOMULCH project

Integrated solution for innovative biodegradation  
control of agricultural plastic mulches



# What is the problem?

Polyethylene mulching film is used in field to improve the crops, but what happens when harvest is finished and mulching film is abandoned in soil because is expensive or difficult to collect and recycle it?







That is!!!

plastic is accumulating in the soil

# Biomulch project

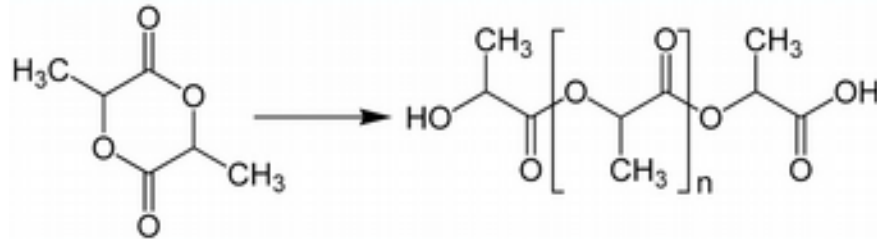
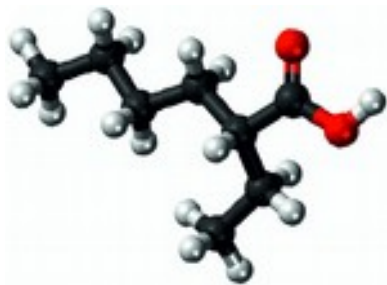
BIOMULCH project addresses the development of completely biodegradable mulch film based on compounding techniques and selection of natural additives. The mulch film is designed to have a determined degradation capacity (30-40 days) by selected microorganisms, independently of abiotic and biotic conditions of the crop area. This is a much shorter period than EN 17033 or EN-ISO 17556





# Biomulch project: biodegradable polymers

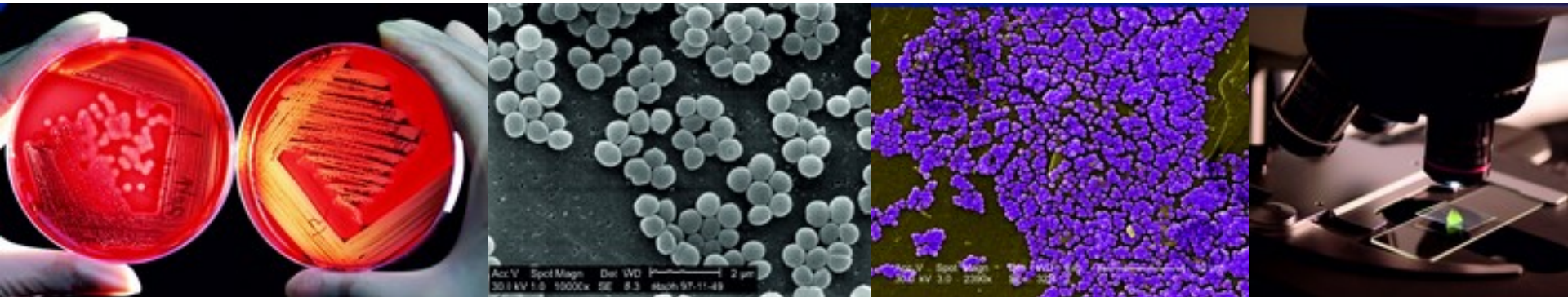
BIOMULCH consortium develops at competitive cost, bioplastic formulation based on a mixed biodegradable polymer and microorganisms-linker (polysaccharides) which in combination with the appropriate enzymes and microorganisms will be able to control biodegradation process. The mulch remains stable during storage and use, and it biodegrades at the time established by the farmer.





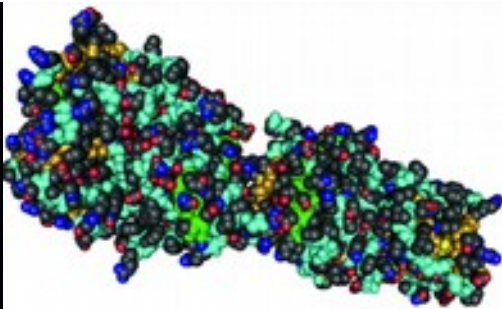
# Biomulch project: Microorganisms

The microorganism solution of the BIOMULCH kit is made of a mix of the microorganisms and enzymes in the adequate proportion. When the farmer decides to biodegrade the mulch film, the microorganism solution needs to be inoculated 30-40 days before. The formation of a coating will occur on the surface of the film, called “biofilm”; it is made up of enzymes and microorganisms which penetrate the plastic.



# Biomulch project: Enzymes and Microorganisms-linkers

The main chain incision to start degradation is made by enzymes, catalysing the hydrolysis of ester linkages of the biodegradable polymer. They break down the polymer into smaller molecules, which provides greater accessibility to the polymer chain for moisture and microorganisms. The microorganisms-linker, included in the plastic compound formulation, creates an important attraction for microorganisms which consume the small plastic molecules to be utilized as carbon and energy sources.



# Biomulch project: Validation in real scennario

The interaction between microorganism and the compound samples is being examined. The biodegradation test are simulating different climatic conditions according to target countries. The biofilm formed over the film, which is made up of microorganisms which penetrate the plastic, is being analyzed. Enzymes act as catalysts which will increase the reaction rate in any environment.





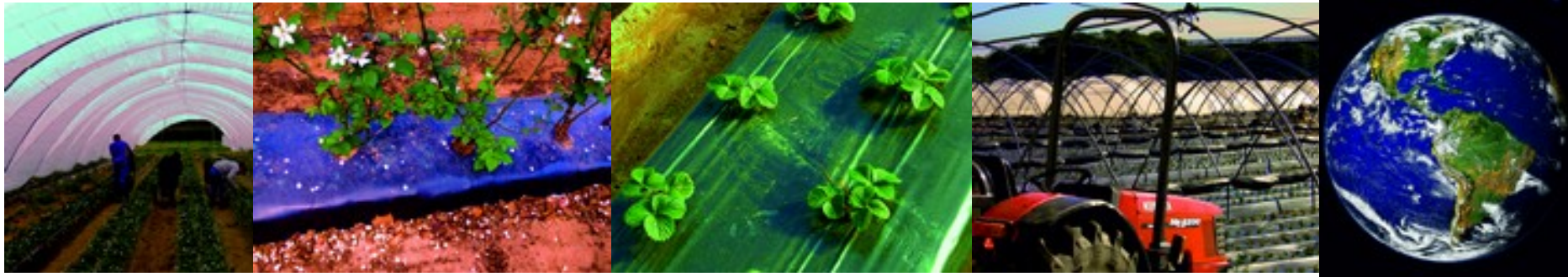
# Biomulch project: expected results

BIOMULCH will save time and reduce costs, besides solving both economical and environmental problems in terms of waste pollution of polyethylene mulch films. BIOMULCH will be the first mulch in the market capable of achieving complete biodegradation in an agricultural soil in the short term.



# Biomulch project: on the market

Biomulch consortium aims to solve the important problem of plastic mulches, covering current needs of European farmers. The BIOMULCH product will cover this important market segment of mulch films, with 280,000 hectares in the Mediterranean area, therefore it has a clear European dimension which can be extended to a more international level. Biomulch development will contribute to the needs of the European and global markets and will have an important social and environmental impacts.





# Biomulch project: partners



Thank you very much for your attention

**[www.biomulch.eu](http://www.biomulch.eu)**

**BIOMULCH Project**

