



UNIMORE

UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA



Life Sciences Department

"Food packaging studies and applications targeting sustainability at BIOGEST-SITEIA"

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BIOGEST Siteia

*“Packaging and Innovations: which strategies for
sustainable Food Chains?”*

INTERREG EUROPE “FoodChains 4 UE

Bologna 12th February 2019



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Life Sciences Department
Agri-food Science Area

Basic researches on main
topics of food technology,
food packaging and food
safety

Education
First level degree in ***Agricultural and
food science and technology***
Second level Degree in ***Food quality
control and safety***

Belongs to High
Technology Network (HTN)
of Emilia-Romagna region
Know-how transfer

The mission of BIOGEST-SITEIA is to create
a strict relationship between the primary
production and the food processing steps in
order to obtain a virtuous continuous line
(from farm to fork) at the end of which a food
product with an high nutritional, hygienic and
sensorial quality could be obtained.

Our research topics (Food Technology, Food packaging and Food Microbiology Group)

Active packaging

Antimicrobial and
antioxidant releasing
plastic material (PVOH)

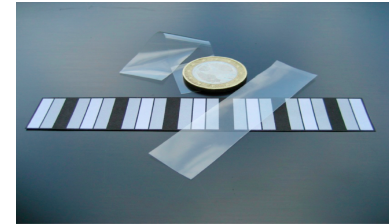


Figure. Image of the PVOH crosslinked film

Edible films and coatings

Alginate and pectin
based materials
(also active)



Our commitment to sustainability is realized also with the reduction of food waste, through the appropriate design of the packaging systems for the extension of the food products shelf life.

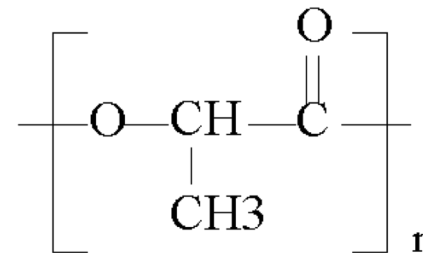
The past: close collaboration with



PLA, high potential polyester **for food packaging applications:**


Polymer	Tensile Strength (MPa)	Tensile Modulus (GPa)
LDPE	6.2-17.2	0.14-0.19
HDPE	20-37.2	-
PET	68.9	2.8-4.1
PS	41.3-51.7	3.1
PA6	62-82.7	1.2-2.8
PP	33-37.9	1.1-1.5
PLA	40-60	3-4

- Appropriate mechanical properties
- Properties depending to the ratio between the two mesoforms (L and D)
- biocompatible, compostable materials
- competitive price




Weak points of PLA:

- low heat distortion temperature
- low long term stability
- high gas permeability



chilled products with a limited shelf-life (i.e. dairy products, fresh meat and fish, salad dressing, etc..).

Applications

- 
- MAP (limited use)
 - oxidative processes sensitive food (ex. cheese)
 - long term shelf life

Experimental plan to evaluate compostability of PLA expanded trays (OUT of LABS!!)

Composting facility : AIMAG (Fossoli, Italy)

Samples: expanded PLA trays, laminated with plain PLA



added to a mixture of organic municipal waste and inert organic material (wood branch)

85000 kg total weight

+ 250 kg of PLA (0.29% w/w)





The sample was crammed in a delimited area of aerated tunnel, where biooxidation occurs, for **17 days** (November 2006)



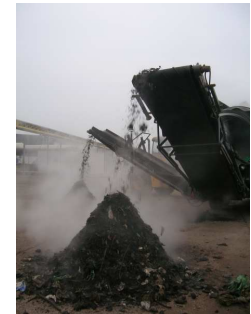
First compositional analysis



The sample was maintained in open air for **45 days** (January 2007)



Second compositional analysis



Results obtained

After 17 days of biooxidation



A biodegradation of about 31.4% was estimated.

Results obtained After 60 days



	kg	%
Wood	7.54	38.85
Cellulosic material	0.54	2.21
Fibers	0.32	1.31
Plastics	0.12	0.49
PLA	0.0009	0.003
Organic mix	15.92	65.14
Total	24.44	100

“Passive modified atmosphere packaging.

Shelf-life extension of blue molded cheeses packaged in poly(lactic acid) trays.

Introduction

The shelf-life of a lot of food products, which fall into the category of fresh or very fresh foods, is usually prolonged by means MODIFIED ATMOSPHERE PACKAGING IN VERY HIGH BARRIER MATERIALS, in order

- to prevent as long as possible their interactions with oxygen, responsible for microbiological and oxidative decay
- to maintain as long as possible a discrete carbon dioxide partial pressure inside the package, with the aim to slow the microbial proliferation

However, it is well known that for a lot of food products the complete exclusion of oxygen and an excessive accumulation of carbon dioxide inside into the packages headspace may be detrimental for their right and prolonged preservation.

Fresh minimally processed vegetables

Cheeses with smear rind

Blue veined cheeses

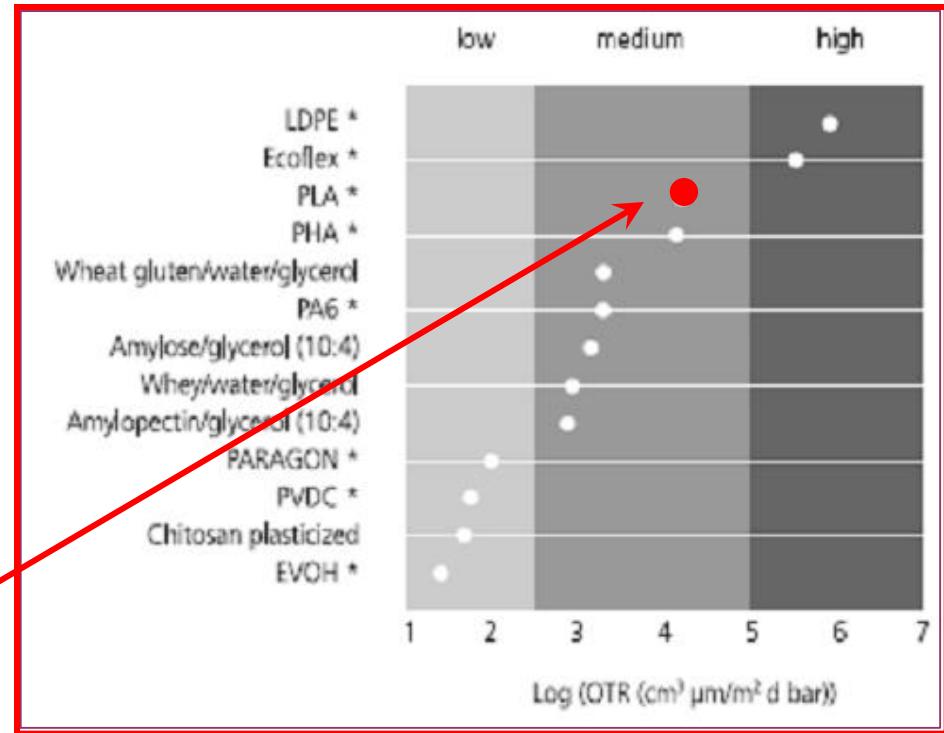
They continuously respire and need a constant uptake of oxygen, suffering a complete anoxia; they are also damaged at different extent by high carbon dioxide partial pressure

..... The CHALLENGE is..... **ACTIVELY CONTROL THE PASSIVE ATMOSPHERE MODIFICATION** by means of:

- selection of the right packaging material, with its own gas barrier performances and permselectivity
- design of right dimensions and shape of packages
- evaluation of the food product needing in term of “minimum oxygen intake” and of “maximum allowable CO₂ partial pressure”

WHY PLA?

- BIOPOLYMER with low environmental impact
- DERIVED FROM RENEWABLE SOURCE
- EXCELLENT FUNCTIONAL PROPERTIES (mechanical, optical, flexibility and long term stability) that enable its industrial application.
- ITS POOR GAS BARRIER PROPERTIES MAY COMPLY WITH THE AIM OF THIS WORK



Aim of this work



The main goal is to guarantee to Gorgonzola a 4 weeks shelf-life, as the actual packaging system allows: medium-high barrier plastic materials, coupled with a MA consisting of CO₂/O₂/N₂: 10/20/30

Gorgonzola was supplied by a single producer (Emilio Mauri SpA, Pasturo, Italy). The cheeses were portioned and packaged in thermoformed, transparent PLA trays, closed with a lid made of 30 μ m PLA film (Biophan, Treofan Germany GmbH & Co, Raunheim, Germany).

.....simplifying packaging could be a good solution.....



Time ZERO



After 4 weeks

Final remarks

- PLA packages can be used for storage of Gorgonzola cheese for a period of at least 4 weeks, with limited and not significant modification of its chemical, microbiological and sensorial profile.
- PLA packages be a valid alternative to traditional paper wrapping of this type of cheeses, but also to packages made with plastic polymers, contributing to reduce the impact of food packages on the environment.

The present



Granting society with **LOw** environmental impact innovative **PACK**aging.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773375, running from 2018 to 2021, coordinated by University of Montpellier (France). The consortium involves 16 partners from research organizations, universities and private companies from Belgium, France, Germany, Hungary, Ireland, **Italy** and Portugal





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GLOPACK

We're waiting to meet you to share expertise and to network!

7

Countries

16

Partners

3

Packaging innovations

3

Value chains

1

Stakeholders' Platform

1

Market replication

1

Software platform

Total budget

EUR 6,658,650

Duration

36 Months

Period

June 2018 – May 2021

Contact us: GLOPACK@umontpellier.fr



www.glopack2020.eu



twitter.com/GLOPACKP



[@Glopack project](https://www.linkedin.com/company/glopack-project)



Project funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 773375

GLOPACK

Join our Stakeholders' Platform

and get free access to research and networking in the field of innovative, sustainable food packaging!



[GLOPACK Stakeholders' Platform](#)



Horizon 2020
European Union Funding
for Research & Innovation



UNIVERSITÉ
DE MONTPELLIER

Project funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 773375



Granting society with LOW environmental impact innovative PACKaging

Advantages of being a Stakeholders' Platform member:

- early access the GLOPACK results,
- meet other stakeholders,
- connect to people in your own field of work,
- discuss the issues related to sustainable and biodegradable food packaging with peers,
- explain your needs for new packaging solutions and the pre-requisites of their practical applications in your work.

How can you become member of the GLOPACK Stakeholders' Platform?

The Stakeholders' Platform members will receive early access to the project results therefore they are requested to sign a Non-Disclosure Agreement, which covers confidentiality and intellectual property issues.

According to the GDPR 2016/679, you have at any time, a right of access to and rectification of all of your personal data.

What is GLOPACK:

GLOPACK aims to lift the sustainable food packaging innovations' *barriers to market* by promoting these innovations to consumers and food businesses.

GLOPACK is focusing on three food packaging areas:

- **Biodegradable materials** made from agro-food residues,
- **Active packaging** to improve food preservation and shelf-life without additives,
- **Radio Frequency IDentification (RFID)** system that uses smartphone readable food labels that monitor in-pack food freshness.



Be part of the future of food packaging and join to our Stakeholders' Platform!

If you require more information, or if you want to join our Stakeholders' Platform, please contact us:

University of Montpellier:
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and
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 www.glopack2020.eu



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The project focuses on three food packaging areas:

- **Biodegradable materials** (e.g. bio-composite films and rigid/semi-rigid trays) made from agro-food residues (Polyhydroxyalkanoates and ligno-cellulosic fibers),
- **Active packaging** with O₂ scavengers and volatiles anti-microbial emitters to improve food preservation and shelf-life without additives and
- **Radio Frequency Identification (RFID) system** that uses smartphone readable food labels that monitor in-pack food freshness.

The future

.....our idea of environmentally friendly

- ***Reduction***
- ***Re-use***
- ***Recycle***
- ***Renewable***

We have to face the challenge of more sustainable food packaging system with an “hurdle technology” approach or a “360° point of view”

Overpacking/packaging : long term shelf life food product

WHY?

1st Secondary packaging

2nd Secondary packaging

3th Secondary packaging

Primary packaging



Old packaging: 1 waxed-paper pouch (380 g net weight) + printed cardboard box

New packaging: 2 plastic pouch (PE) – 190 g net weight each + printed cardboard box

WHY?

Let me introduce You to



PACKTIN

Using food waste to avoid food loss

OUR CORE

Food Waste



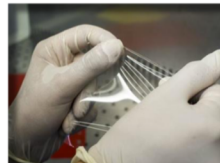
Extraction



Natural preservative



Biodegradable Packaging



Natural Polymers and bio-active compounds



Food Technology and Food Microbiology Group
Life Science Department

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