



"With the co-financing of Greece and the European Union"

# From agricultural waste to textiles: A research project to transform peach residues to sustainable textiles

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“UniWA is the third largest university in Greece with regards to the number of undergraduate students (in regular season) whereas it hosts over 50,000 students in total”

- ❑ The University of West Attica (UNIWA) was founded in March 2018. The foundation of the newly established University resulted from the merging process of the former Technological Educational Institute of Athens and the Piraeus University of Applied Sciences.



<https://www.uniwa.gr/en/>  
<http://sapke.uniwa.gr/>

## The project

# Innovative Bridal Dresses and Baptismal Clothes From Peach Textile With eco-Consciousness IBDPTEC



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Co-financed by the European Regional Development Fund of the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE  
(project code:T1EDK-00084)

## The idea



- ▶ In a climate changing environment, the shift to sustainable production is becoming a necessity.
- ▶ The increased activity in the modern agricultural sector produces plenty of wastes the handling of which is putting more pressure to the public waste management systems.
- ▶ Agro-residues are annually renewable and a low-cost source for natural cellulosic fibres.
- ▶ There is a declining supply of natural raw materials in the textile industry making the utilization of agricultural waste fibre an attractive option to make use of the tremendous wealth of natural plant fibre which is currently discarded.
- ▶ Cellulosic crops such as cotton take up space from food because of their higher monetary value. Fashion may be considered to fuel food shortages.

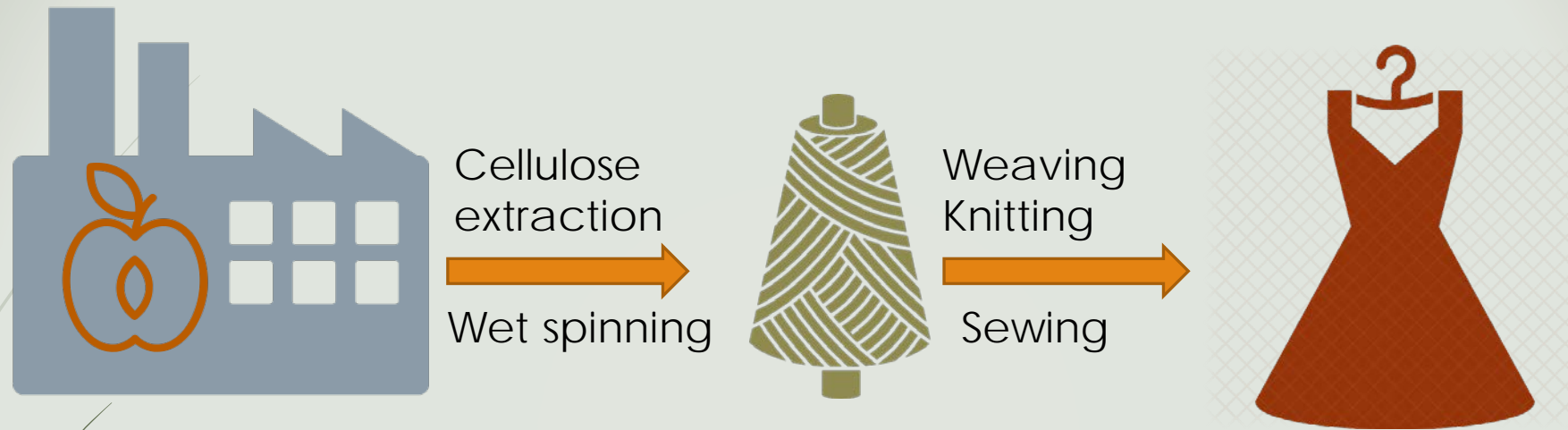
## The idea



- ▶ Greece: 5<sup>th</sup> place in world production of peach
- ▶ Processed peaches (compote, jams, juice) have been successfully exported all over the world + 98% of the canned peach produced in Greece is exported
- ▶ New fields are planted with peach trees for the food processing sector
- ▶ It is estimated that about 100.000 tons of peach residues end up in land fields



## Targets



- Valorizing the peach wastes and turning them to luxury goods
- Use of eco-friendly processes
- Shift to ethical and fair trade fashion
- Circular economy
- Boost of collaborative initiatives between the food sector and fashion
- Reactivation/reinvention of the textile sector in Greece that has shrunk during the past decades

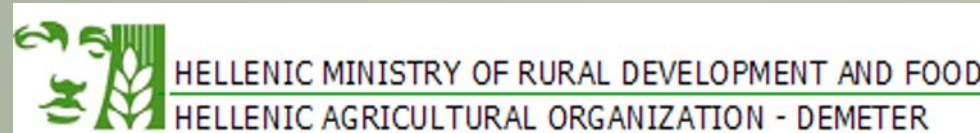
# IBDPTEC project steps include

- An extensive literature review of the state-of-the-art technology to transform biomass to usable cellulose fibre.
- The development of the experimental process to extract cellulose from the food industry's peach residues by exploring different chemical and mechanical methods.
- The creation of the regenerated fibre via wet spinning to be used as raw material for the fabric production. The use of blends for strength or texture will be considered.
- Testing the final properties of the regenerated cellulose fibre/fibers developed.
- The analysis of the best possible type of fabric to be produced (woven, knitted) and its design in line with the final properties of the developed regenerated fibre or fibres.
- Testing the final properties of the fabric produced.
- The study of different dyeing methods.
- The final design of garments taking into consideration the specific properties of the prototype fabric that will be created.
- A capsule collection of bridal dresses and christening cloths made of the peach-cellulose fabric by Luccia B.

## The partnership



Collaborating with :



**Miltiadis V Christopoulos, Georgios Markou**, Institute of Technology of Agricultural Products - Hellenic Agricultural Organisation-DEMETER, **Greece**  
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Preliminary results:  
Cellulose Extraction from peach residues

# Cellulose extraction optimization procedure

## Core step

## Optimization parameters

Raw  
material  
selection

- Form (flakes, ground)
- Moisture

Pre-  
treatments

- Drying (sun, oven 70-100°C)
- Grinding-sieving (1-3 mesh)

De-fatted

- +/- Acetone

Bleaching

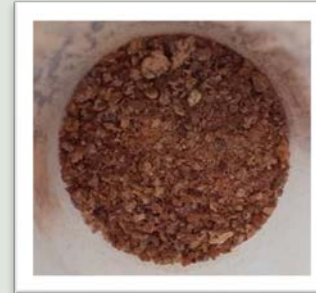
- H<sub>2</sub>O<sub>2</sub> treatment (tissue : solvent, time, temperature)
- O<sub>3</sub> treatment (concentration, time)

Cleaning

- Acid treatment (acid, tissue : solvent, time, temperature)
- Alkali treatment (tissue : solvent, time, temperature)

Final  
processing

- Drying (30-50° C)



# Cellulose extraction data

## Core step

## Implemented parameters

Raw  
material  
selection

- Form: Flake form from industry without primary processing
- Moisture: 80%

Pre-  
treatments

- Drying: Sun dried for 48 h; Oven dried at 100°C for 24h
- Grinding-sieving at 1 mesh

De-fatted

- Acetone: tissue:solvent = 1:1

Bleaching

- H<sub>2</sub>O<sub>2</sub> 30% v/v (tissue : solvent = 1:50, 2h, 70°C)

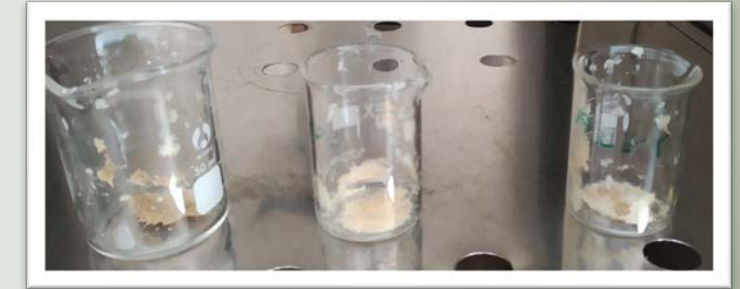
Cleaning

- Acid treatment: Formic:acetic acids = 1:1 (tissue : solvent = 1:10, 30 min, RT)
- Alkali treatment: NaOH 20% w/v (tissue : solvent= 1:10, time= 1.5h, 70°C)

Final  
processing

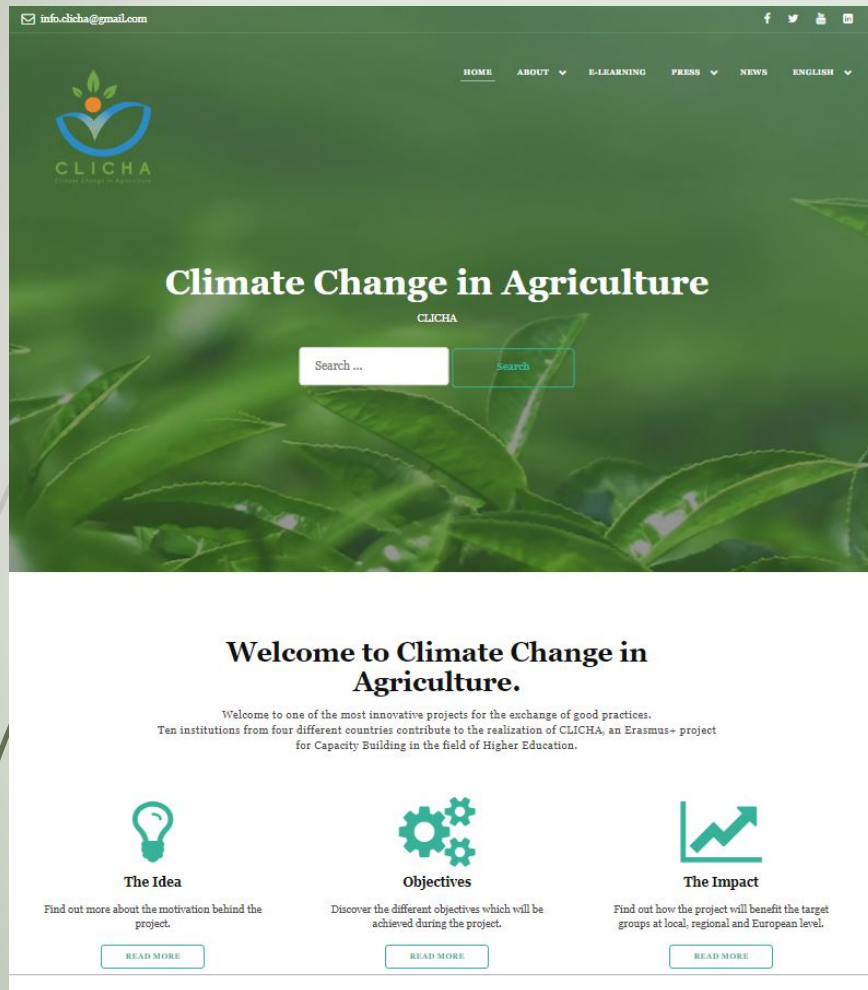
- Drying (50° C, 12 h)

Final product > 90% cellulose; efficiency = 10%

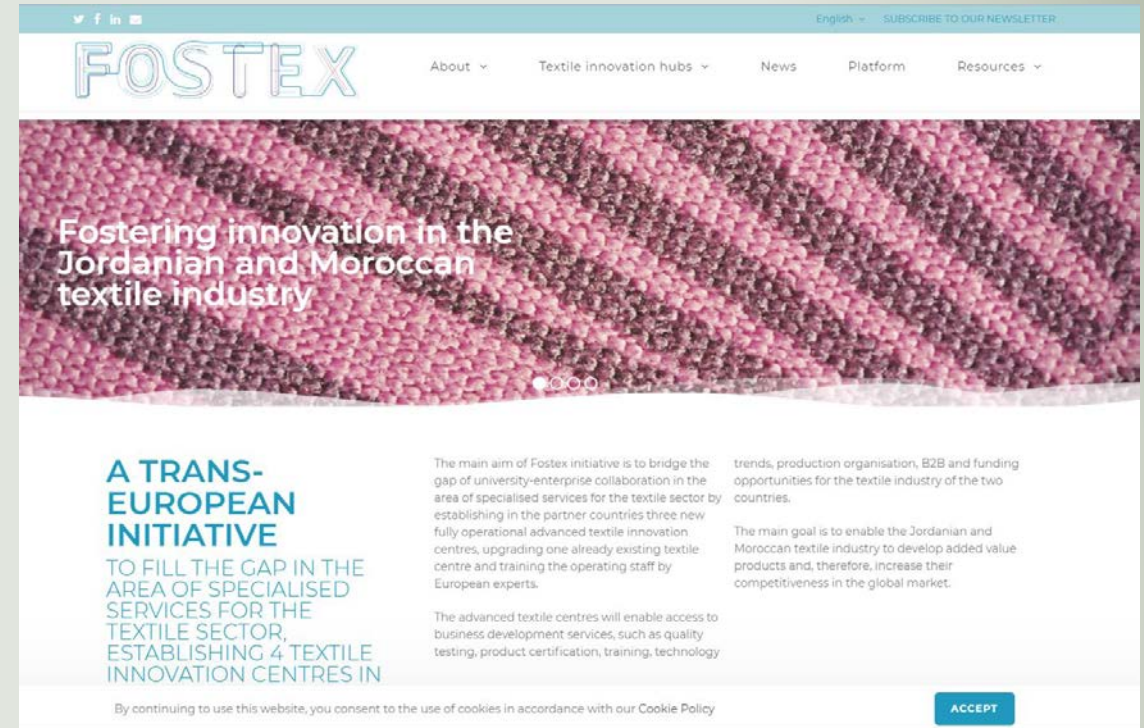




## Other projects



<http://clicha.eu/>



<http://fostexproject.eu/>



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Thank you for your attention!

Many steps ahead!



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