

# ADVANCES IN >> HYDROTHERMAL CONVERSION OF INDUSTRIAL BIOGENIC RESIDUES INTO INTERMEDIATE BIOENERGY CARRIERS

RESULTS FROM THE **F-CUBED PROJECT**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 884226.





**Life**  
**COMP** *Olive*

**LIFE-COMPOLIVE PROJECT: AUTOMOTIVE  
AND FURNITURE BIOCOMPOSITE  
PROTOTYPE PARTS WITH 40% OF  
REINFORCING WOOD FIBERS FROM  
OLIVE TREE PRUNING WASTE**



**Project Acronym: LIFE-COMPOLIVE**

**Project Name: New generation of biocomposites based on olive fibers for industrial applications**

**Project Reference: LIFE18 ENV/ES/000309**

**Budget: ~ 1.7 M€**

**Valorization of olive tree pruning waste → Biocomposites for automotive and furniture.**

**Benefits:**

- 1. To avoid burning waste in the field**
- 2. To substitute fossil-based raw materials**



Olive grove



Olive tree pruning waste



Biocomposite

## Biocomposite

Natural fiber (reinforcement) + Polymer matrix. Other natural fibers are: linen, jute...

LIFE-COMPOLIVE Project:



Natural fiber:  
Olive tree pruning fiber

+



Polymer matrix:  
Recycled polypropylene,  
Polylactic acid...

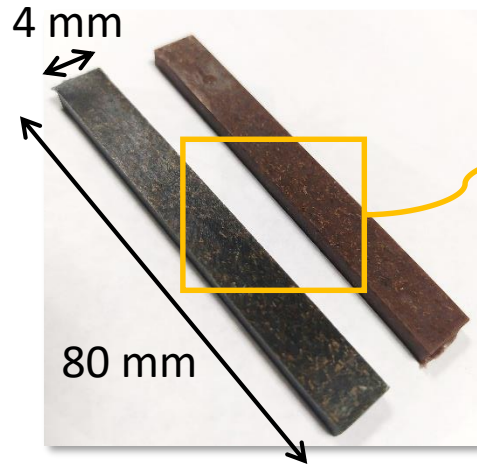
→



Biocomposite



## COMPOLIVE Biocomposite



## Project Consortium

Leader:

**andaltec**

CENTRO TECNOLÓGICO DEL PLÁSTICO

Partners:



**Plasturgia**



**Plasturgia**



**andaltec**  
TECHNOLOGICAL CENTER



Universidad de Jaén



## Consortium

### Industrial Users:

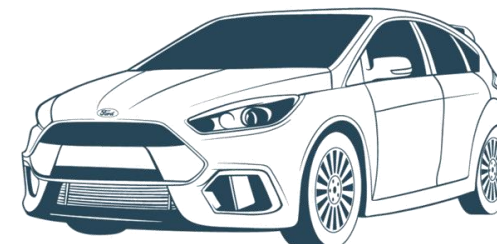


**Ford-Werke GmbH**

**Ford Research and Innovation Center Aachen (Germany)**

### Objectives:

- Physical-chemical requirements of biocomposites for automotive.
- Biocomposite prototype parts for Ford's vehicles.
- Replicability to Ford's factories.





## Consortium

### Industrial Users:



**Plasturgia - Caliplast**  
ZA La Moune, La Planche (France)

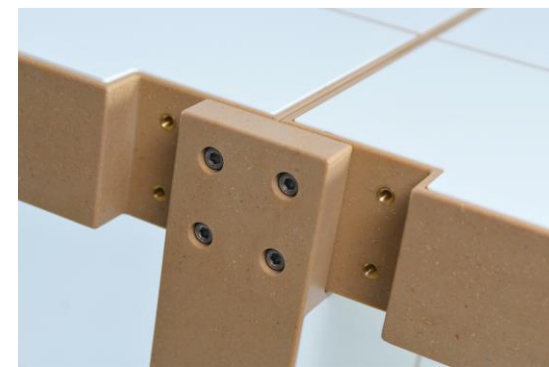
# Plasturgia

**caliplast**  
OUVRONS NOS HORIZONS



### Objectives:

- Physical-chemical requirements of biocomposites for home furniture.
- Biocomposite prototype parts for home furniture.
- Replicability to other products.





## Consortium

### Industrial Users:



**Matricería Peña**  
Íllora, Granada (Spain)



### Objectives:

- Physical-chemical requirements of biocomposites for urban furniture.
- Biocomposite prototype parts for urban furniture.
- Replicability to other products.



## Consortium

### Leader:

# andaltec

CENTRO TECNOLÓGICO  
DEL PLÁSTICO



**ANDALTEC Technological Center**  
Martos, Jaén (Spain)



### Objectives:

- Processing of olive fiber.
- Characterization and scaling-up of biocomposites manufacturing.
- Project coordination and economic justification.
- Dissemination and public awareness.



## Consortium

### Partners:



**Grupo de Bioprocesos-TEP-138**  
**University Institute of Research in Olive Groves and Olive Oils**  
**of the University of Jaén (Spain)**

### Objectives:

- Selection of olive fiber and polymer materials.
- Design of both laboratory-scale and large-scale fiber treatment.
- Dissemination.





## Consortium

### Partners:



**CITOLIVA, Centro Tecnológico del Olivar y el Aceite  
Mengíbar, Jaén (Spain)**

### Objectives:

- Analysis of the olive tree pruning residue.
- Logistics of olive tree pruning.
- Networking and dissemination.



## Expected Results

### Environmental

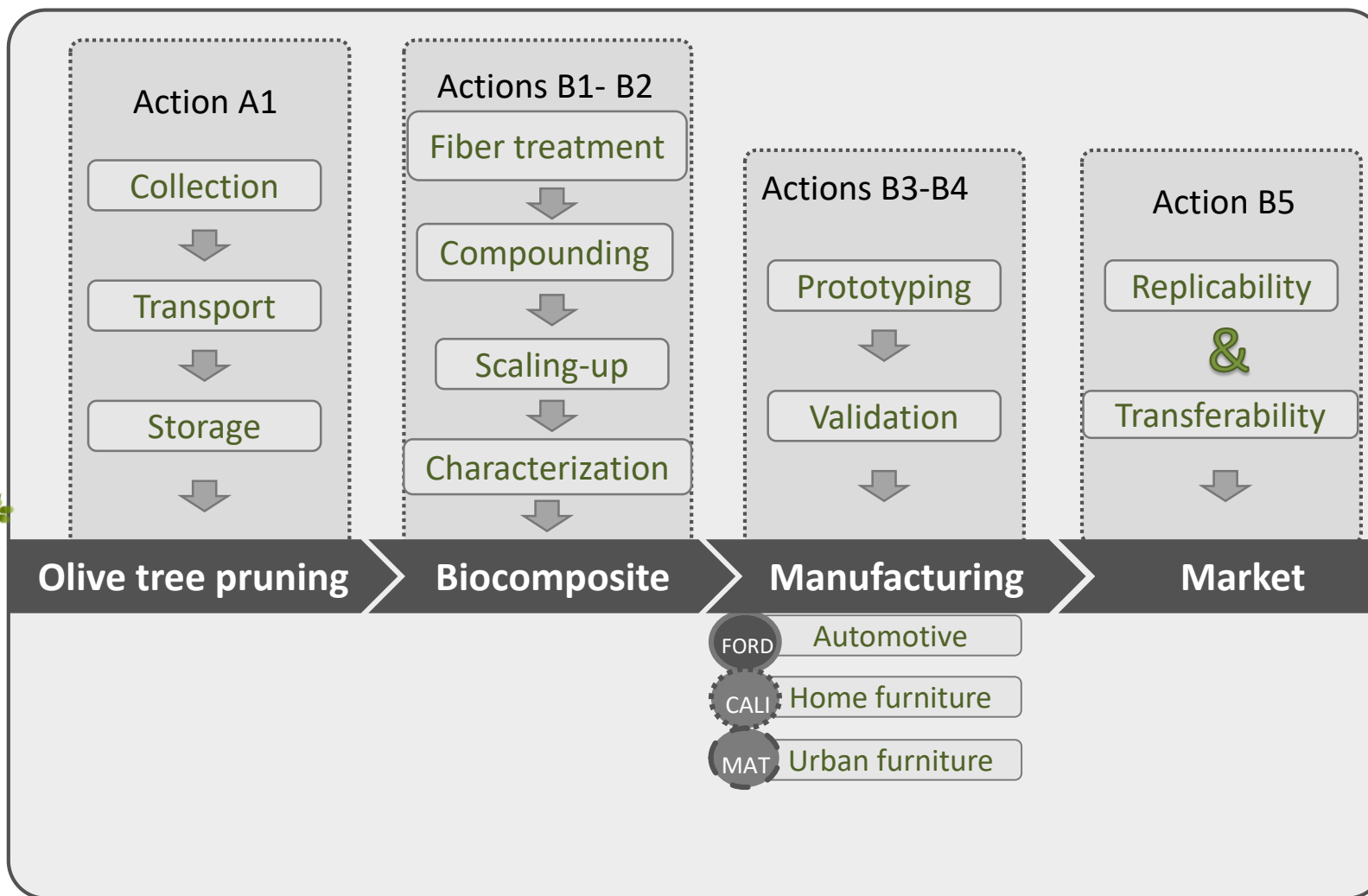
- Valorization of olive pruning residue
- Creation of a sustainable material with a high content of biowaste

### Techno-economic

- Development **8 different biocomposites at lab scale, 4 of them scaled up**
- Manufacturing of olive fiber-based composites
- Manufacturing of **3 real prototyping demonstrators**: Market feasibility analysis keeping competitive costs
- Transfer to stakeholders the advantages of the biocomposite

### Social

- Implication of primary sector and policy makers awareness through dissemination activities



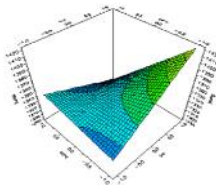
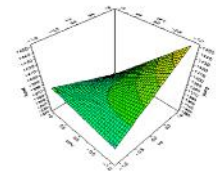
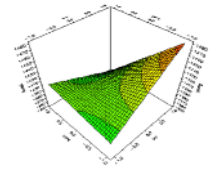


## Collection of Olive Pruning and Pre-Milling



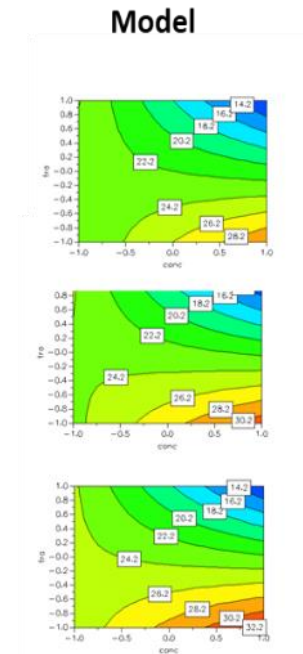
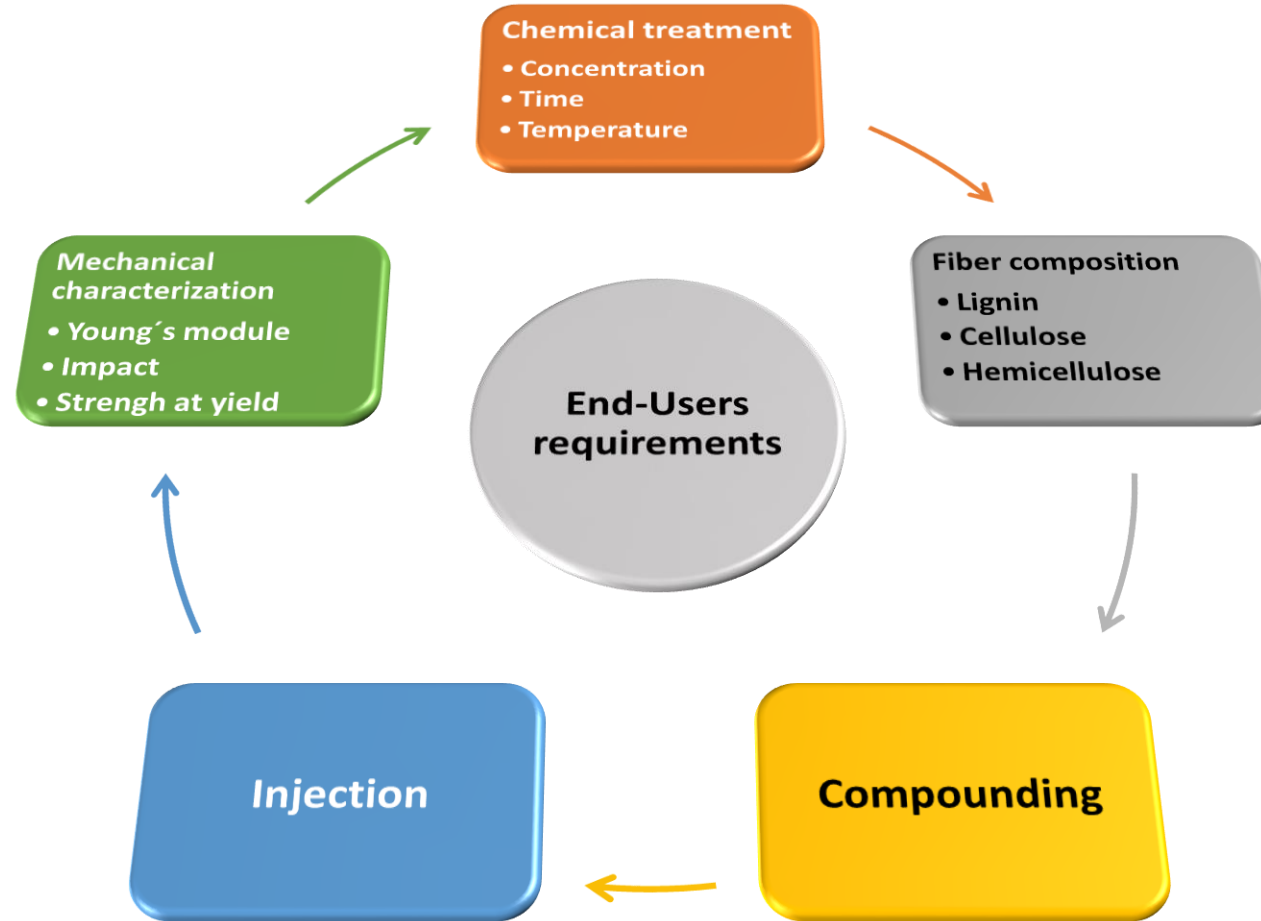
## Biocomposite Compounding

## Design Of Experiments



time = 1

*Young's modulus model*

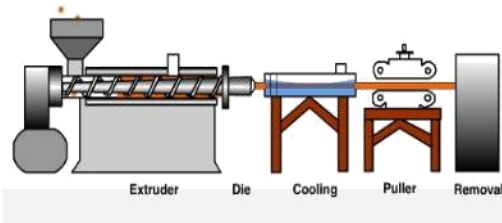




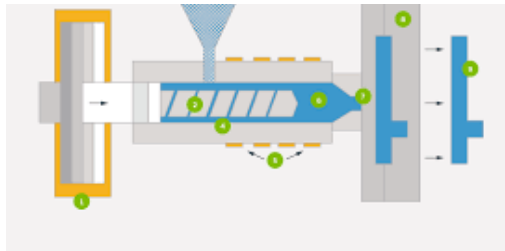
## Chemical Treatment & Biocomposite Extrusion & Injection



Chemical treatment at laboratory scale



Compounding of biocomposite



Injection molding



## Prototyping and Validation



Injection trials



**FORD FOCUS FOOTREST**



## Prototyping and Validation

FORD MONDEO TRUNK TRIM



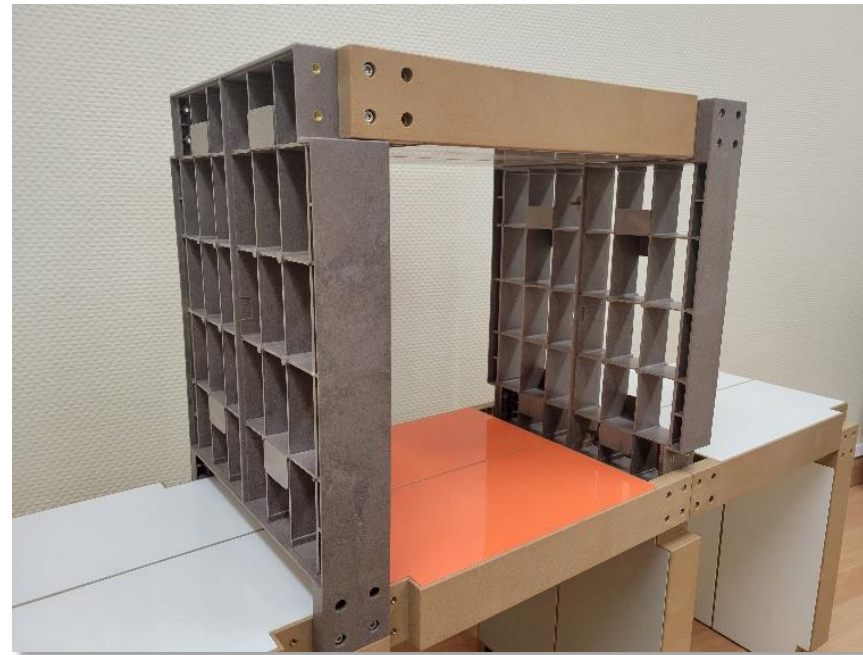


## Prototyping and Validation

# Plasturgia



Urban furniture

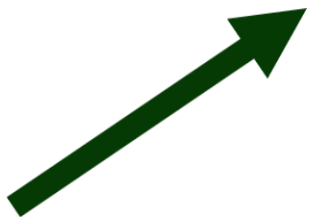


Home furniture





## Innovation Radar



### SMART & SUSTAINABLE SOCIETY INNOVATION

## Comp0live - New bio material from olive pruning waste

SHARE:

#### Market Maturity: **Business Ready**

These are innovations that are putting concrete market-oriented ideas together and are, for example, pursuing market studies, business plans, engagements with relevant partner and end-users. [Learn more →](#)

#### Market Creation Potential

This innovation was assessed by the JRC's Market Creation Potential indicator framework as addressing the needs of **existing markets and existing customers**. [Learn more →](#)

#### Women-led innovation ♀

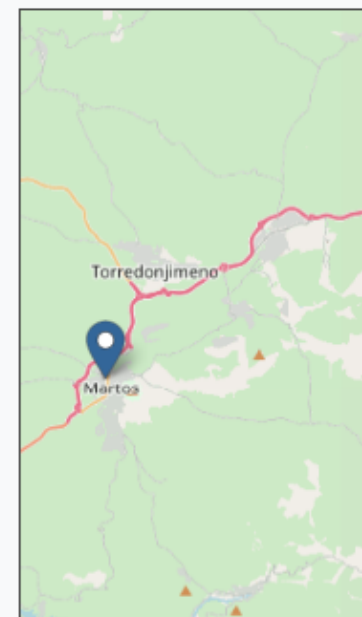
A woman had a leadership role in developing this innovation in at least one of the Key Innovator organisations listed below.

#### Go to Market needs

Needs that, if addressed, can increase the chances this innovation gets to (or closer to) the market include:

- Prepare for Market entry
- Secure capital
- Scale-up market opportunities

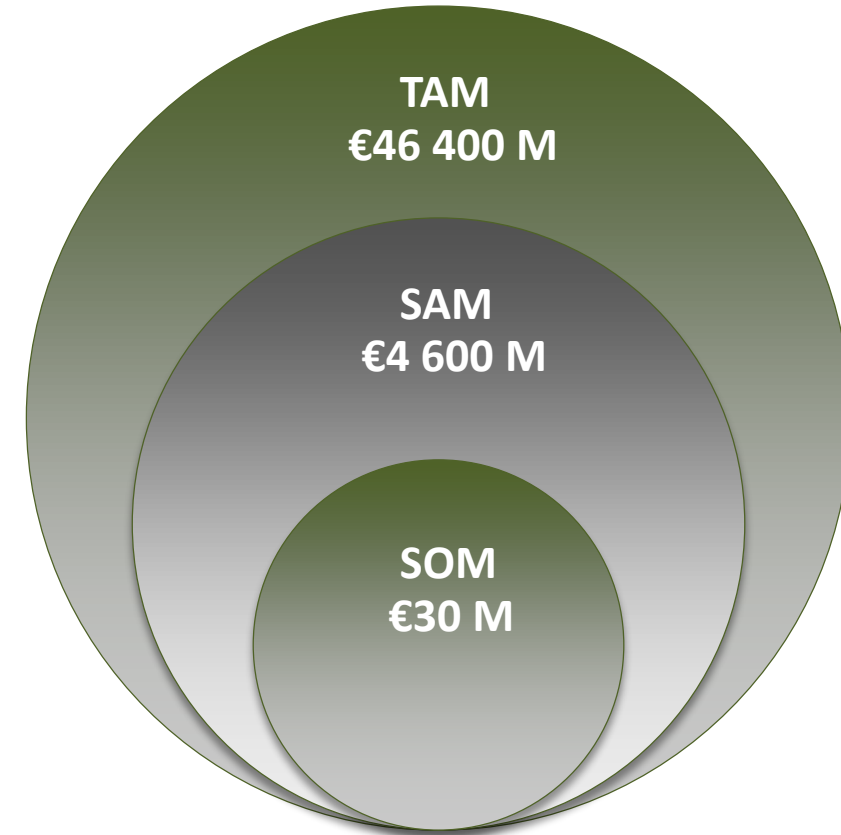
#### Location of Key Innovators



[Webtools](#) | [Leaflet](#) | [© OpenStreetMap contrib](#)

## Innovation Radar

- (TAM, total addressable market). Global biocomposites market:  
**TAM = €46 400 M**
- (SAM, serviceable available market).  
Global annual market of biocomposites in **automotive and furniture sectors**: **SAM = €4 600 M**
- (SOM, service obtainable market)  
Expected global biocomposites market for the **industrial users** of the project **COMPOLIVE**: **SOM = €30 M**



## Market Potential

- There are more **2.5 Mha** of olive groves in **Spain**.
- **1.5 tons of olive pruning** are produced per **ha** of olive grove and per **year**.
- Thus, more than **3.5 Mtonnes** of olive tree **pruning waste** are available per **year** in Spain.
- Thus, a total of around **3.5 Mtonnes** of COMPOLIVE **biocomposite** could be produced in **Spain** per year by using olive tree pruning waste.
- The production of the COMPOLIVE **biocomposite** could generate an **annual revenue of more than € 3500 M**.



Olive groves in Mediterranean Spain



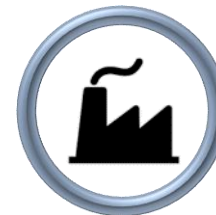
## Expected Success

- Olive tree pruning → **Economic benefit** for **Farmers**



- Competitive advantages** (based on Circular Economy):

- ✓ More sustainable materials → **Value proposition**
- ✓ EU Directives → **Market** continuity



- Biocomposite industry** → High **added value**

- Local jobs:**

- Design of biocomposites
- Processing of olive tree pruning
- Biocomposites manufacturing



## 7 Competitive Advantages of the Business Model



**NO MORE OLIVE GROVES ARE NEEDED TO MEET DEMAND**



**FEW MANUFACTURERS KNOW HOW TO GRIND THE OLIVE PRUNING**

$$\text{€}_{\text{BIOCOMPOSITE}} = \text{€}_{\text{POLYMER}}$$

**BIOCOMPOSITE COST IS SIMILAR TO THAT OF THE POLYMER**



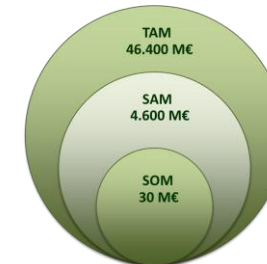
**SAME EXTRUSION TECHNOLOGY AS FOR CONVENTIONAL PLASTICS**



**NEW BUSINESS MODEL: SUPPLY OF FINAL BIOCOMPOSITE**



**CUSTOM-DESIGNED BIOCOMPOSITE FOR INDUSTRIAL APPLICATIONS**



**TOTAL PRUNING WASTE IN SPAIN -> €3500 M OF BIOCOMPOSITE ANNUAL PRODUCTION**

## Conclusions

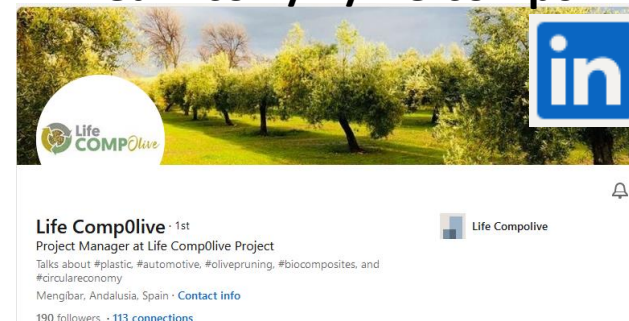
- The LIFE-COMPOLIVE Project is presented.
- Biocomposites were developed according to End-Users requirements.
- The scaling-up of biocomposite production is nearly completed.
- Industrial prototypes are developed
- The market potential is demonstrated
- Competitive advantages arise



# THANKS FOR YOUR ATTENTION !

<http://www.lifecompolive.eu/>

<https://www.linkedin.com/in/life-compolive/>



Dr. Juan Pablo Ferrer Rodríguez  
R&D Project Manager  
Andaltec Technological Center  
juan-pablo.ferrer@andaltec.org  
T: +34 953 555 117



# THANK YOU



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 884226.

