OLIVEN

Opportunities for olive oil value chain enhancement through the by-products valorisation
(2018 – 2021)

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Coordinator: University of Jaén, Spain

Kick-Off Meeting – 06 June 2018, UJA, Linares, Spain







CONSORTIUM

Project starting date: 06/06/2018 - Project ending date: after 30 months: 5/12/2020

ARIMNet2 funding requested: 227.000 €

CONSORTIUM

- **Partner 1 (Coordinator):** University of Jaén (UJA), Spain
- **Partner 2:** Ankara University (AU), Turkey
- **Partner 3:** Olive Research Institute (ORI), Turkey
- **Partner 4:** Institut de l'Olivier (IO), Tunisia

- **Collaborators (e.g. research institute, cooperative, extension services…)**
  - Cooperative Aceites Guadalquivir, Spain.
  - Cooperative LA UNIÓN: 2nd largest olive oil mill in Spain.
  - LAVOLA: Consultancy (SME) with high quality expertise in Life Cycle Analyses (LCA) and Life Cycle Costing (LCC).
  - **Other COLLABORATORS from Tunisia and Turkey?**

BACKGROUND / CHALLENGES

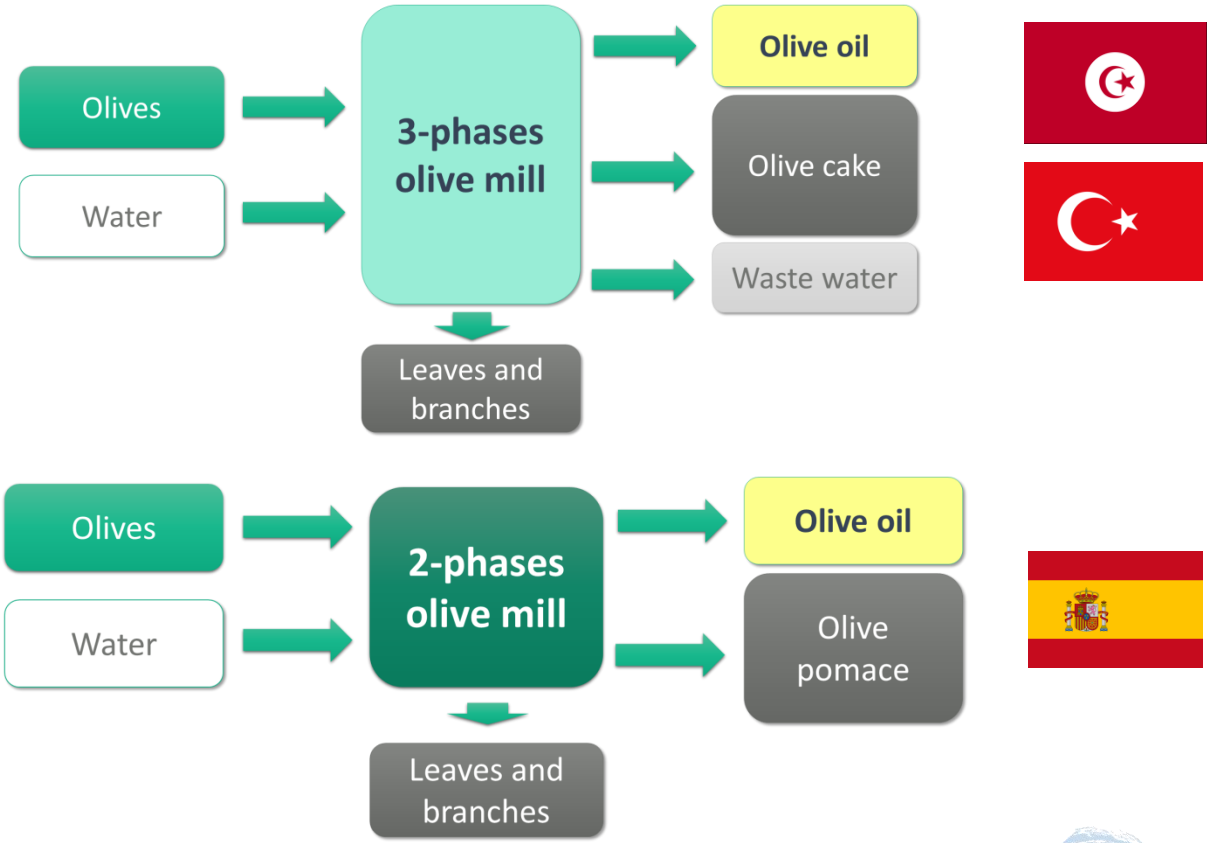
Background: The olive oil sector in the Mediterranean countries

	Area harvested (Ha)	Average Oil production (10^3 Tonnes)
Spain	2.507.684	1.275
Italy	1.143.363	403
Greece	927.955	284
Tunisia	1.746.360	179
Turkey	847.738	164
Syria	693.668	158
Morocco	919.385	122
Portugal	348.654	77
Algeria	343.113	62
Egypt	58.988	15

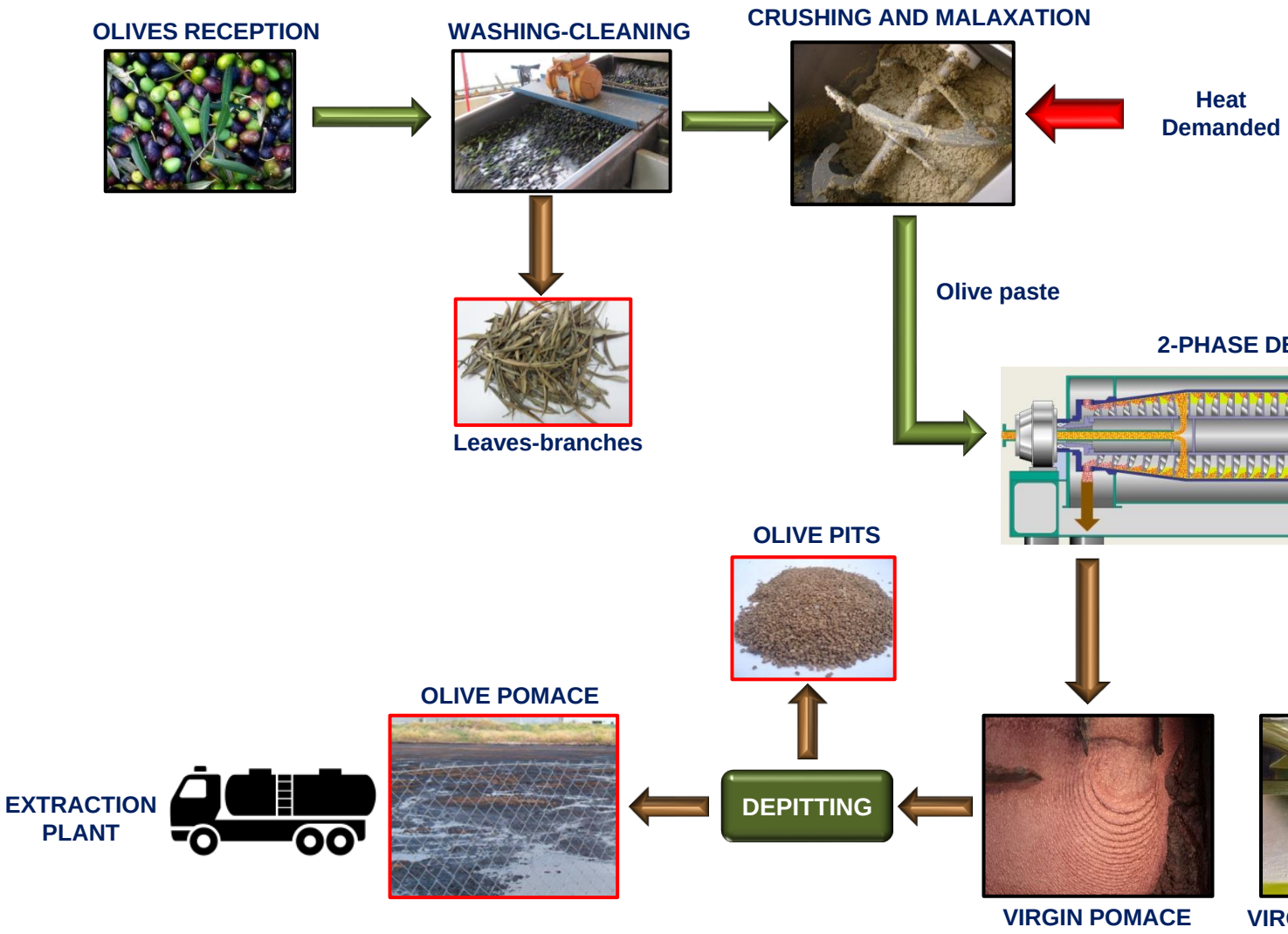
- Largest producers in Mediterranean Countries (1.9 million olive farms)
- Large amounts of waste produced, mostly biomass
- A sector that needs modernisation to face external challenges

BACKGROUND / CHALLENGES

Background: The olive oil production process



BACKGROUND / CHALLENGES



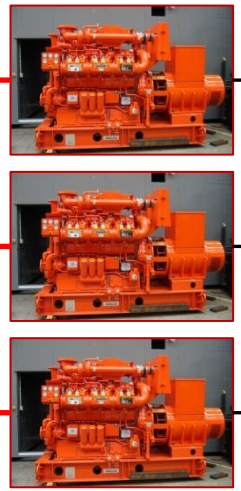
BACKGROUND / CHALLENGES

OLIVE POMACE
(Moisture = 70%)

Olive Pomace Oil

ROTARY DRYERS

Exhaust
gases



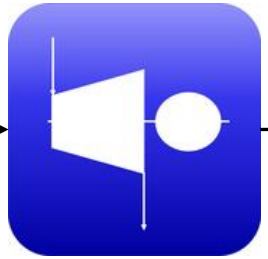
Natural Gas
Engines
(Pe > 5 MW)

Grid
injection

Electricity
Distribution

Domestic
boilers

Exhausted pomace ("ORUJILLO")
LHV = 16-17 MJ/kg,
Moisture = 10-15%



Thermal Plant
(Rankine)

BACKGROUND / CHALLENGES

Background: Olive oil industry wastes/by-products (2-phase)

OLIVE PITS

2-PHASE OLIVE POMACE

LEAVES AND BRANCHES

PRUNINGS

BACKGROUND / CHALLENGES

Background: Olive oil industry wastes/by-products (3-phase)

OLIVE PITS

OLIVE MILL WASTE WATER

OLIVE TREE PRUNINGS

LEAVES, BRANCHES

3-PHASE OLIVE POMACE

BACKGROUND / CHALLENGES

Background: Currently valorization of olive residues (Spain)

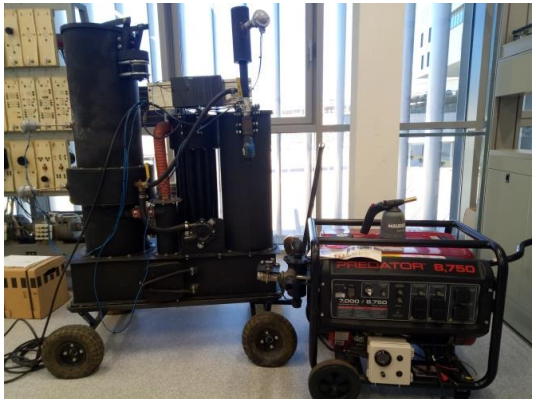
- Olive pomace
  High moisture content
  High phenolic content
- Exhausted pomace
  Established valorization pathways
- Olive stones
  Established valorization pathways
- Leaves and twigs
  No direct valorization available
- Prunings
  Good characteristics for valorization

subsidy

BACKGROUND / CHALLENGES

Background: Successful waste valorization technologies

Biomass Gasification for energy production



BACKGROUND / CHALLENGES

Background: Successful waste valorization technologies

Solar dryers: for drying biomass and still water production

BACKGROUND / CHALLENGES

Background: Successful waste valorization technologies

Other valorization techniques?

- Compost
- Biofertilizers
- Cosmetics
- Antioxidants (olive leaves)

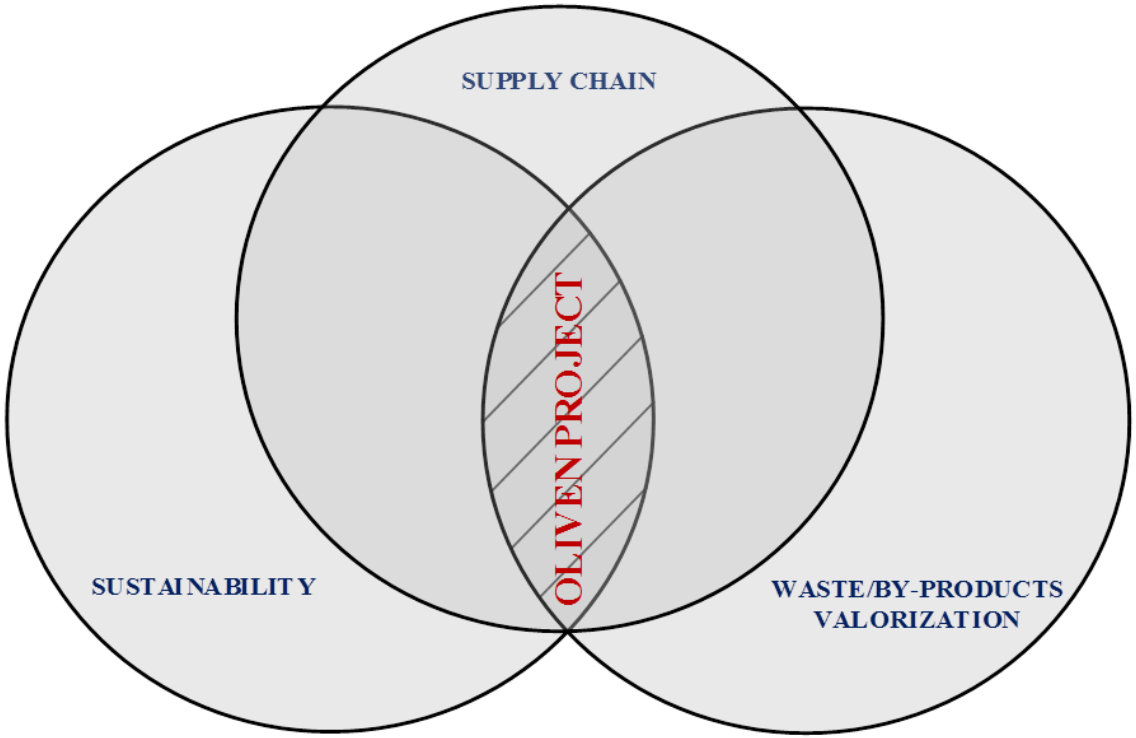
BACKGROUND / CHALLENGES

Challenges

- **DIFFERENT SUPPLY CHAINS IN EACH COUNTRY**: olive oil process (2 and 3 phase, traditional), social, number and capacity of the olive mills, wastes, different farming processes, etc.
- **LACK IN LITERATURE**: few studies about olive oil value chain implementation.
- **NOT MEASURING OF THE WASTE VALORIZATION IMPACT**: environmental (e.g. carbon footprint) and economic
- **DEVELOPMENT OF LCA AND LCC**

BACKGROUND / CHALLENGES

Challenges



Products from waste valorisation

- Energy
- Water
- Fuels
- Fertilizers
- High value by-products
- Others

OBJECTIVES

Main objective of OLIVEN

- **Define successful technologies for olive industry wastes/by-products valorisation** focusing on the value chain enhancement for Spain, Tunisia and Turkey.

Specific objectives

- **State-of-the-art** of the olive oil value chain and current wastes/by-products valorisation techniques in each country.

OBJECTIVES

Specific objectives

- **Identify innovative and mature technologies** for olive wastes/by-products valorisation.
- **Carry out a** Life Cycle Assessment (**LCA**) and Life Cycle Costing (**LCC**) of the current most representative olive oil value chain
  - From “cradle-to-gate”
- **Comparative LCA and LCC** analysis to evaluate the improvements proposed
  - Future simulated scenarios

METHODOLOGY / WORK PLAN

Methodology

OLIVEN is composed of 6 Work-Packages (WP):

- **WP1: Information collection**
  - ✓ State of the art. Most representative value chains
- **WP2: Inventory (LCI) of the waste valorisation technologies within olive oil value chains.**
  - ✓ Development of **questionnaires** for data collection
  - ✓ Preparation of datasets
- **WP3: Carry out a LCA and LCC**
  - ✓ Software SIMAPRO (Consultancy LAVOLA)

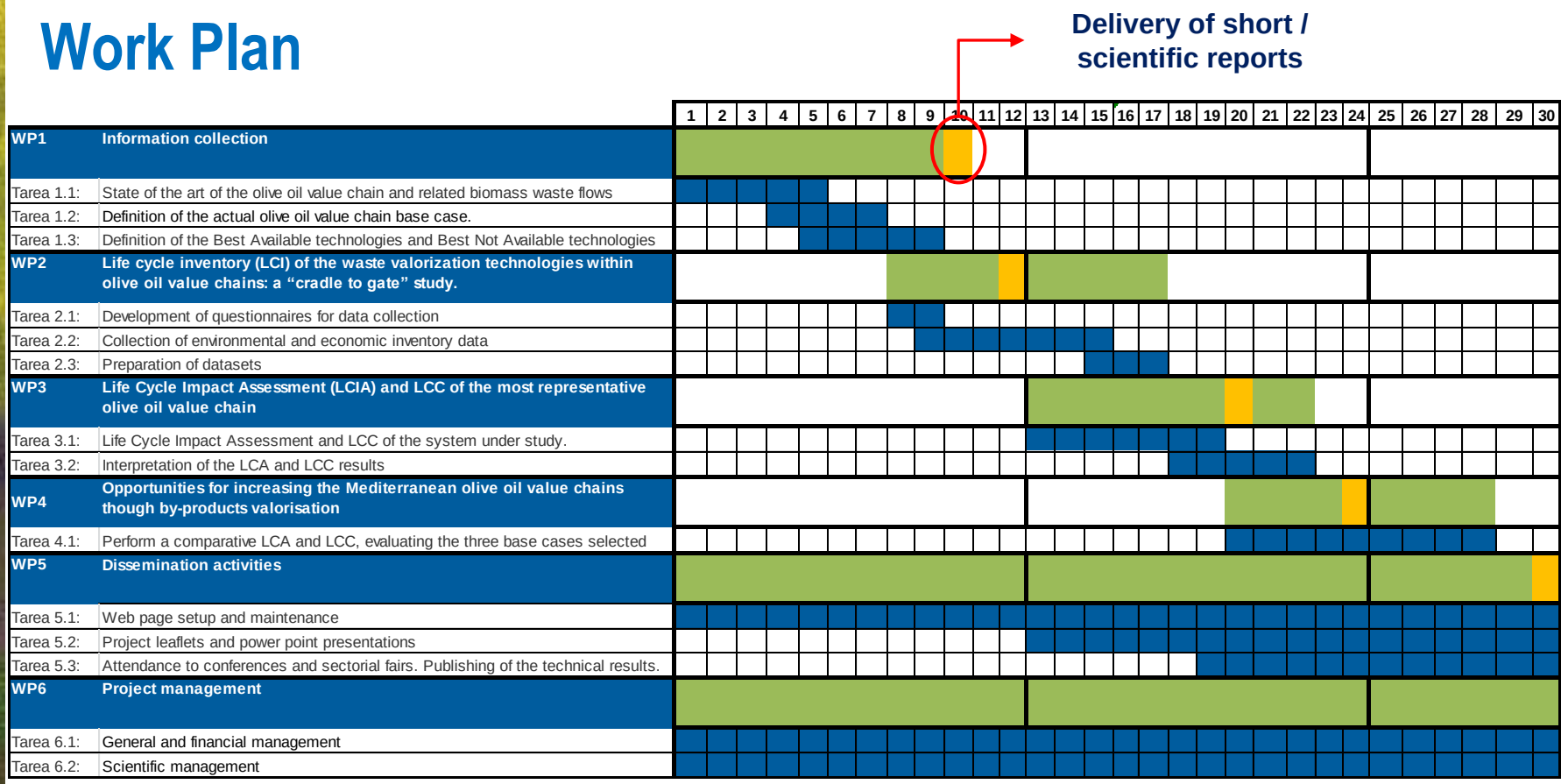
METHODOLOGY / WORK PLAN

Methodology

- **WP4: Opportunities for increasing the Mediterranean olive oil value chains through wastes/by-products valorisation**
  - ✓ Comparative LCA and LCC
- **WP5: Dissemination activities**
  - ✓ Web page setup and Social networks dissemination
  - ✓ Leaflets and power point presentations
  - ✓ Attendance to conferences and sectorial fairs
- **WP6: Project Management**

METHODOLOGY / WORK PLAN

Work Plan



METHODOLOGY / WORK PLAN

Deliverables list

Deliverables list						
Nº	**Deliverable name**	**WP**	**Lead participant**	**Nature**	**Dissemination level**	**Delivery date**
1.1	State of the art of the value chains	1	AU/ORI	R	CO	Month 6
1.2	Best Available and Best Not (yet) Available Technologies	1	UJA	R	CO	Month 9
6.1	First short project update report	6	AU	R	CO	Month 10
6.3	First year scientific report	6	AU	R	CO	Month 12
2.1	Life Cycle Inventory Datasets	2	IO	R	CO	Month 17
5.1	Project dissemination materials	5	ORI	O	PU	Month 18
6.2	Second short project update report	6	IO	R	CO	Month 20
3.1	LCA and LCC for the 3 base cases assessed	3	UJA	R	CO	Month 22
6.4	Second year scientific report	6	IO	R	CO	Month 24
4.1	Comparative LCA and LCC	4	UJA	R	CO	Month 28
5.2	Final plan for using and disseminating the knowledge	5	ORI	O	PU	Month 30
6.5	Final Scientific report	6	UJA	R	CO	Month 30

EXPECTED RESULTS / IMPACT

Expected results

- **Provide useful information for local association** of olive oil producers in Spain, Tunisia and Turkey
  - More sustainable solutions
- Obtain **new solutions** and innovative techniques **for wastes and by-products valorisation**
  - Better environmental-economic sustainability of the value chain
- **Improve soil and water quality** and framing practices with limited input of energy, water and chemicals.

EXPECTED RESULTS / IMPACT

Expected results

- **Enhance the farmers' and olive oil producers' incomes through access to new markets**
  - Energy production: renewable electricity and heat
  - Biomass traders
  - Fertilizers
  - Biofuels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Thank you for your attention!

UJA RESEARCH TEAM

Expertise in supply chain

- **Pedro José Martínez**. Centro Universitario de la Defensa de Zaragoza (Ministry of Defence of Spain). **Young Researcher**

- **José Moyano Fuentes**.

Expertise in waste/by-products valorisation

- **David Vera**. **Young Researcher**

- **Bárbara de Mena**. **Young Researcher**

- **Francisco Jurado**.

FIRST STEPS

Olive oil supply chain characterization

- ✓ **Scope. "Cradle-to-gate":** From olives extraction to mill gate (before the final product is transported to the consumer).
- ✓ **Main Focus: Economic and Environmental Side** during agricultural and production phases

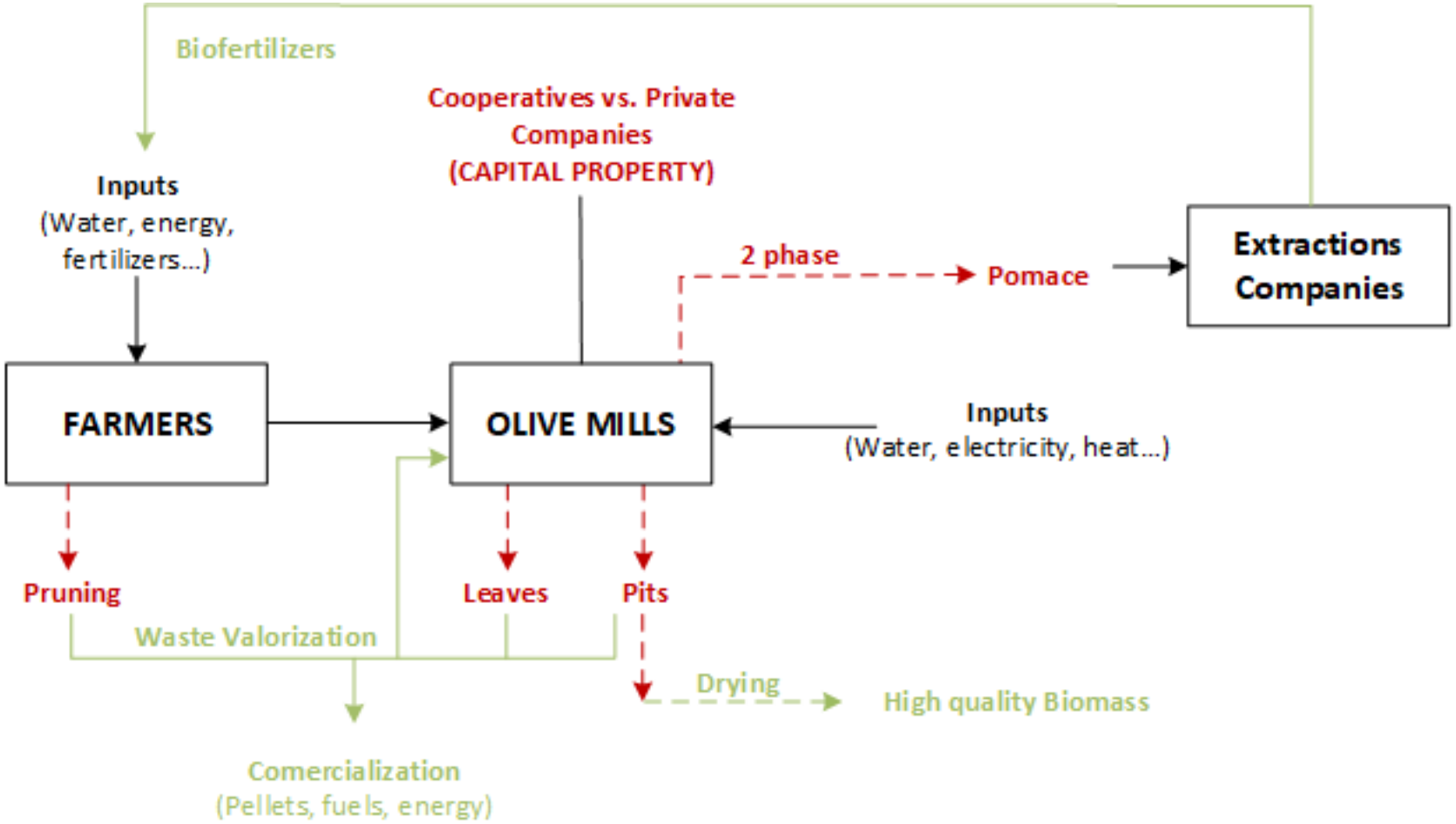
MAIN GOAL:

STANDARDIZATION OF DATA COLLECTION METHODS

… AND DATA ANALYSIS

FIRST STEPS

EXAMPLE: Most representative olive oil value chain in Spain



FIRST STEPS

1. **Represent Supply Chain Structure in each country:**
   - **Agents involved**
   - **Links**
   - **Inputs**: energy, water, fertilizers, wastes, by-products…

2. **Differences between Cooperatives and Private Companies (or others…).**

3. **State-of-the-Art:**

   Waste/By-Product Valorization + Oilve Oil + Supply Chain + Agri-Food

4. **Data Collection Methods (Proposal):**
   - **Interviews**
   - **Questionnaires and datasets**
   - **Expert Panel**