

The International Society for Nutraceuticals and Functional Foods



Reformulating Traditional Mediterranean Foods Using Alternative Technologies

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FunTomP



This project has received funding
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There is an increasing trend by that millennial and young population, that favor foods that are healthy, ethically and naturally sourced, and minimally processed. And this changing consumer tendency has created a significant demand for plant-based protein products.

The Mediterranean diet varies by country and region, so it has a range of definitions. But in general, it's high in **vegetables**, fruits, legumes, nuts, beans, cereals, grains, fish, and unsaturated fats such as **olive oil**.

Despite its anticipated benefits, recent studies have shown that the Mediterranean Diet (MedD) is now progressively disappearing in Mediterranean countries, particularly among the youngest Generations.





More than 90% of olive oil is produced in Mediterranean countries and ~82% of table olive is also produced here.



Sugar Beet Leaves Create Alternative Proteins





Mainland Europe provides 60% of sugar beet production and 56% area (in terms of ha) for cultivation while **Mediterranean countries provide 28%** of the production and 25% of the land. **France, Turkey, and Egypt are among the top 10 sugar beet producers in the world accounting for 23% of the world's production.**

Sugar beet is processed to obtain sucrose and beet leaves are the by-products of sugar processing and mostly left at the field. Sugar beet leaves (SBL) are reported to contain an average of 22.8% crude protein on dry matter basis²³, indicating 400 - 600 kg/ha of protein is present inside the leaves

<http://greenproteinproject.eu/>

Rubisco is a plant protein which is stored in all green leaves. It is responsible for the process of photosynthesis and is considered to be the most abundant protein present on earth. **Sugar beet leaves** also contain Rubisco in high amounts.



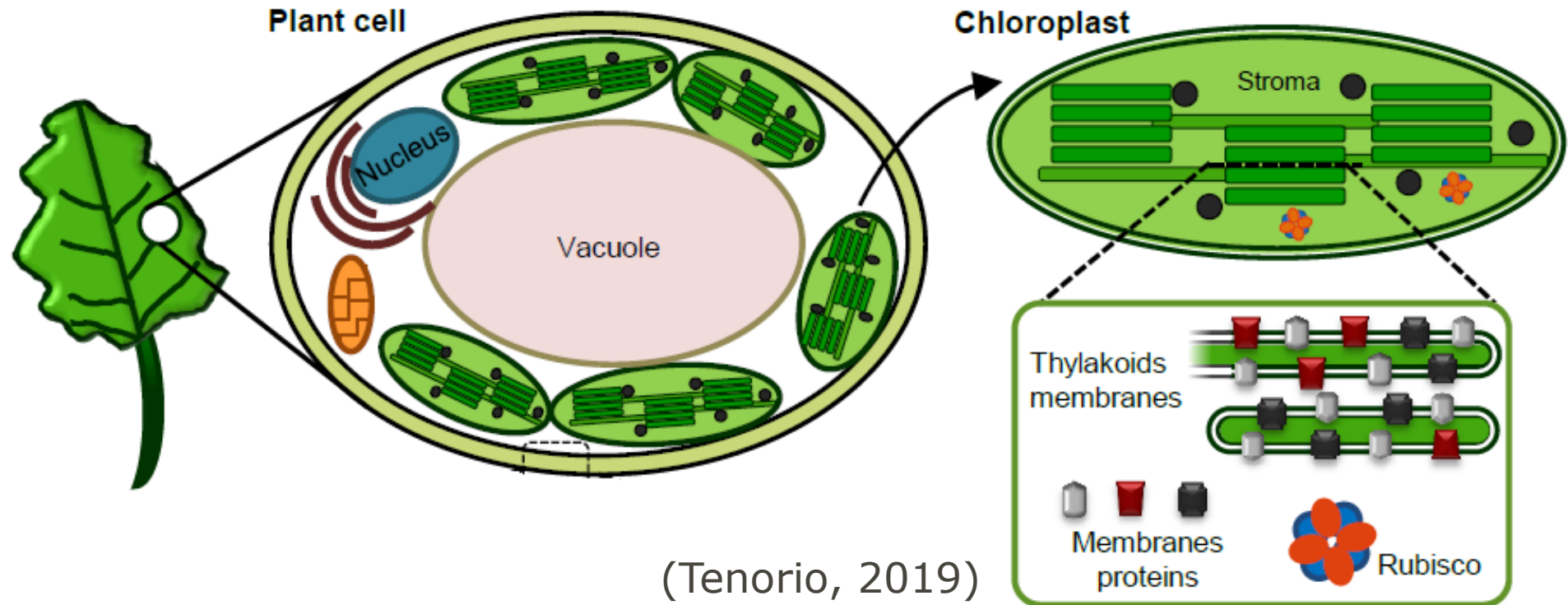
We are in contact with;



Rubisco Foods produces high protein, nutritious plant-based ingredients from **water lentils** and green crops such as **alfalfa** (<https://rubiscofoods.com/>)

Leaf Proteins

- soluble & insoluble proteins
- thylakoid membrane

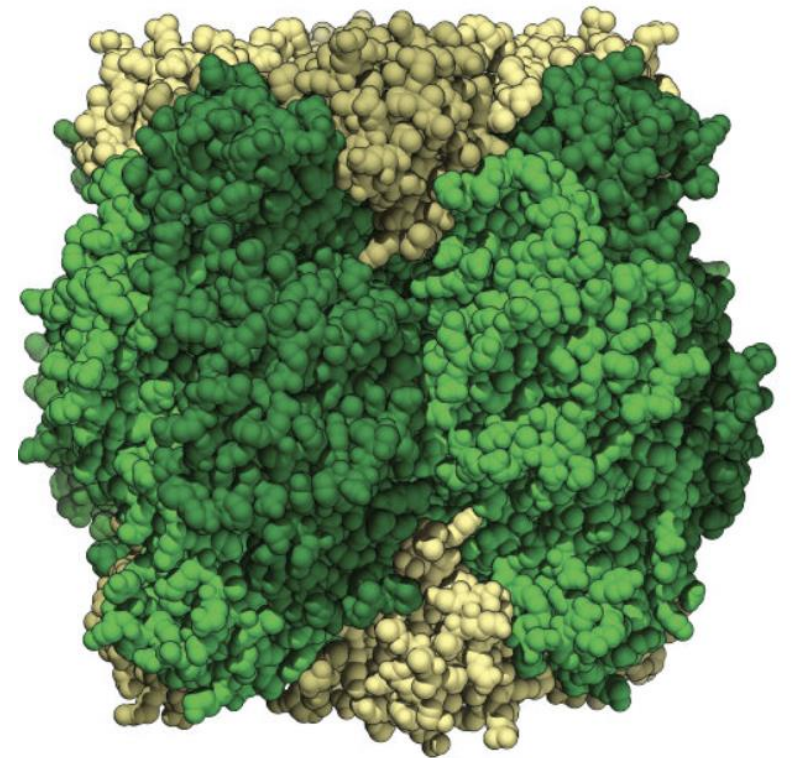


Rubisco Proteins

---- Ribulose 1,5-biphosphate carboxylase/oxygenase (**Rubisco**) is the predominant soluble protein.

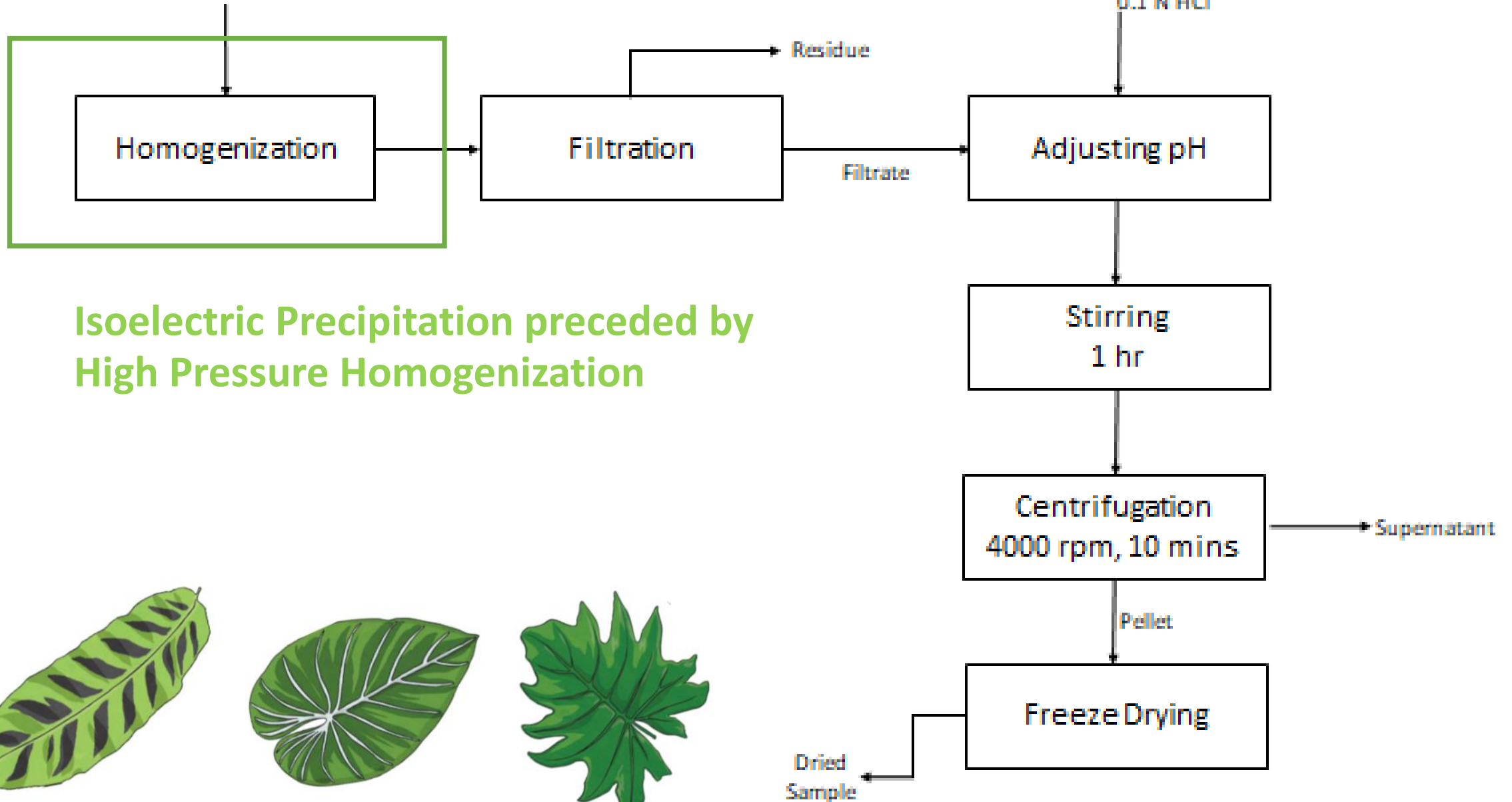
→ It is an enzyme that is responsible for the fixation of CO₂ during photosynthesis and accounts approximately 50% of total soluble proteins that are found in plant leaves.

→ **As it is the main protein in leaves, it is also the most abundant protein in nature**

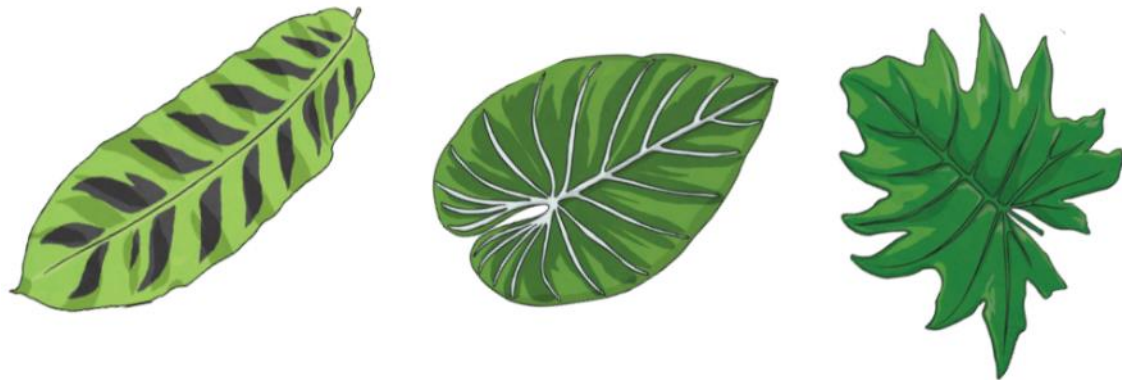


Leaves + pH 6.0 sodium acetate buffer
(1/10, solid(w)/solvent(v))

Homogenization increased the extracted protein up to 20!

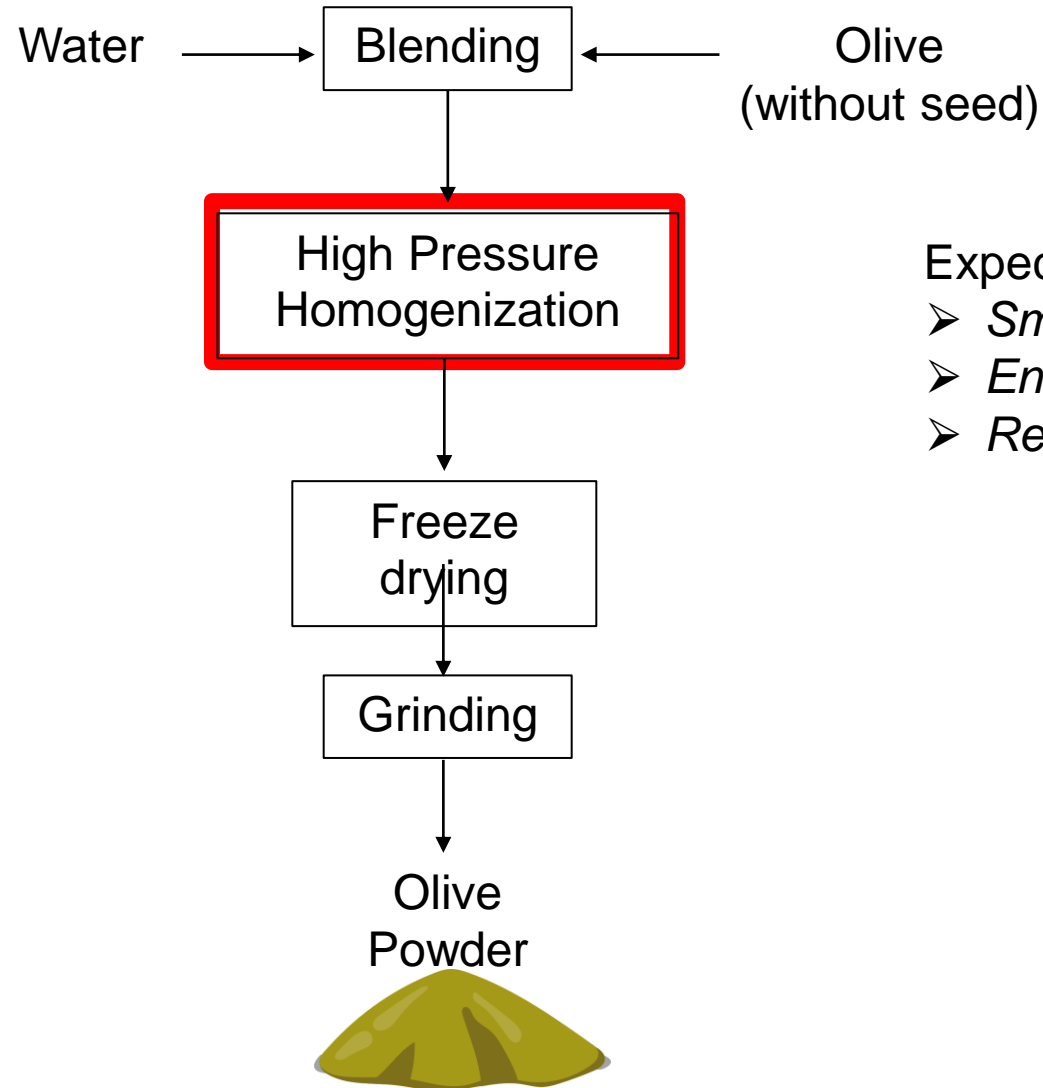


Isoelectric Precipitation preceded by
High Pressure Homogenization





OLIVE POWDER



Expectations from high pressure homogenized olive powder:

- *Smaller oil droplet size*
- *Encapsulation effect with polymers inside the olives*
- *Reduced oil leakage*



FunTomP



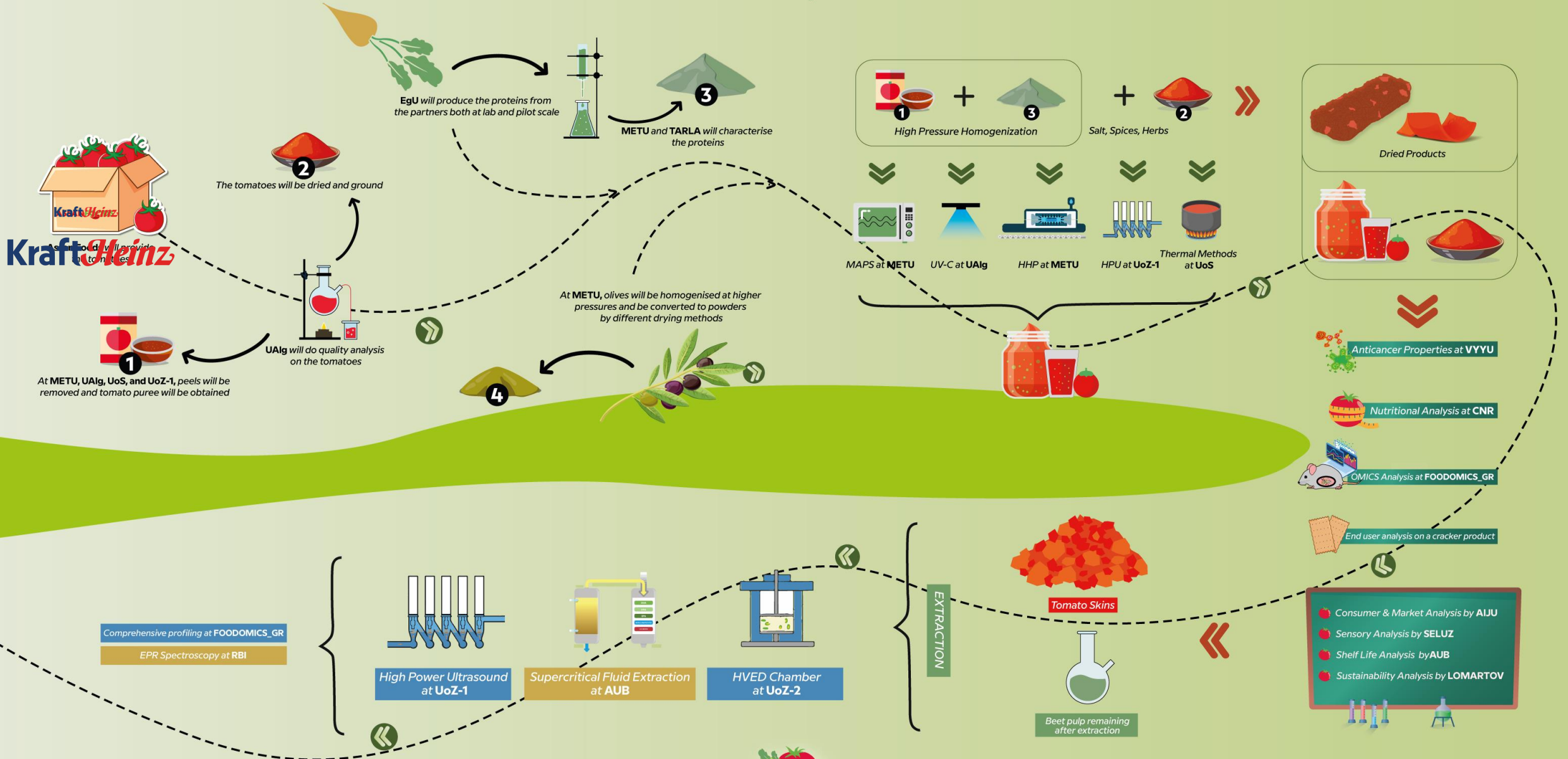
Kraft *Heinz*
seluz.



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Visual Summary of FunTomP



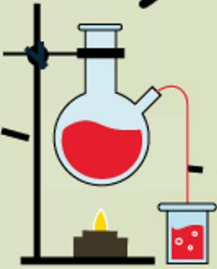


KraftHeinz

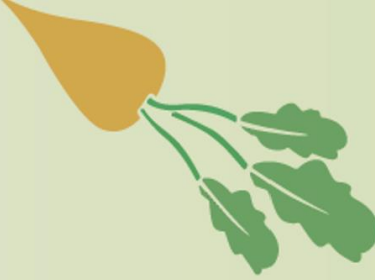
At METU, UAig, UoS, and UoZ-1, peels will be removed and tomato puree will be obtained



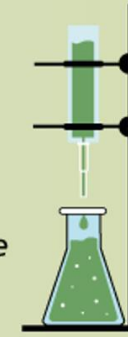
The tomatoes will be dried and ground



UAig will do quality analysis on the tomatoes



EgU will produce the proteins from the partners both at lab and pilot scale

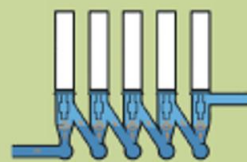
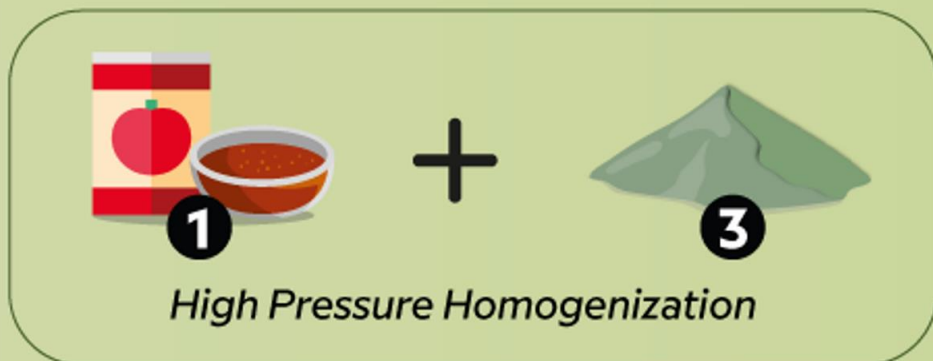


METU and TARLA will characterise the proteins



At METU, olives will be homogenised at higher pressures and be converted to powders by different drying methods





MAPS at METU

UV-C at UAlg

HHP at METU

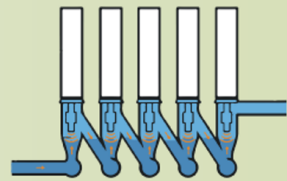
HPU at UoZ-1

Thermal Methods
at UoS

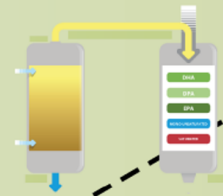


Comprehensive profiling at FOODOMICS_GR

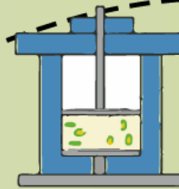
EPR Spectroscopy at RBI



High Power Ultrasound
at UoZ-1

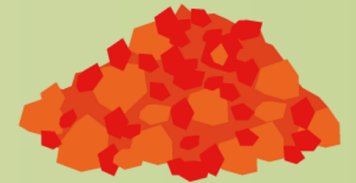


Supercritical Fluid Extraction
at AUB



HVED Chamber
at UoZ-2

EXTRACTION



Tomato Skins



Beet pulp remaining
after extraction





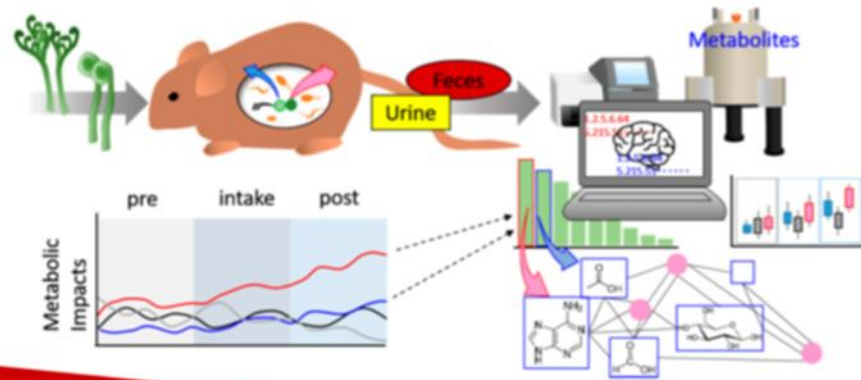
Nutritional analysis @ CNR



Anticancer properties @ VYYU



OMICS Analysis @ FoodOmics_Gr



End user analysis on a cracker product

Consumer & Market Analysis by AIJU

Sensory Analysis by SELUZ

Shelf life analysis by AUB

Sustainability analysis by LOMARTOV



EXPIRATION
DATE: -/-/-

Formulation of tomato snack bar

- Tomato pomace
- Pectin
- Starch
- Pea protein isolate *or* Rubisco protein (3 g)
- Sugar
- Salt
- **Tomato powder**
- Olive powder
- Herbs



Ingredient functionality

- Pea Protein Isolate – texturizing/protein enhancement
- Rubisco – (new plant-based protein source) protein and fiber enhancement
- Pectin, starch – texturizing
- Sugar, salt and herbs – taste
- Tomato powder – color and taste , waste recovery
- Olive powder –antioxidant

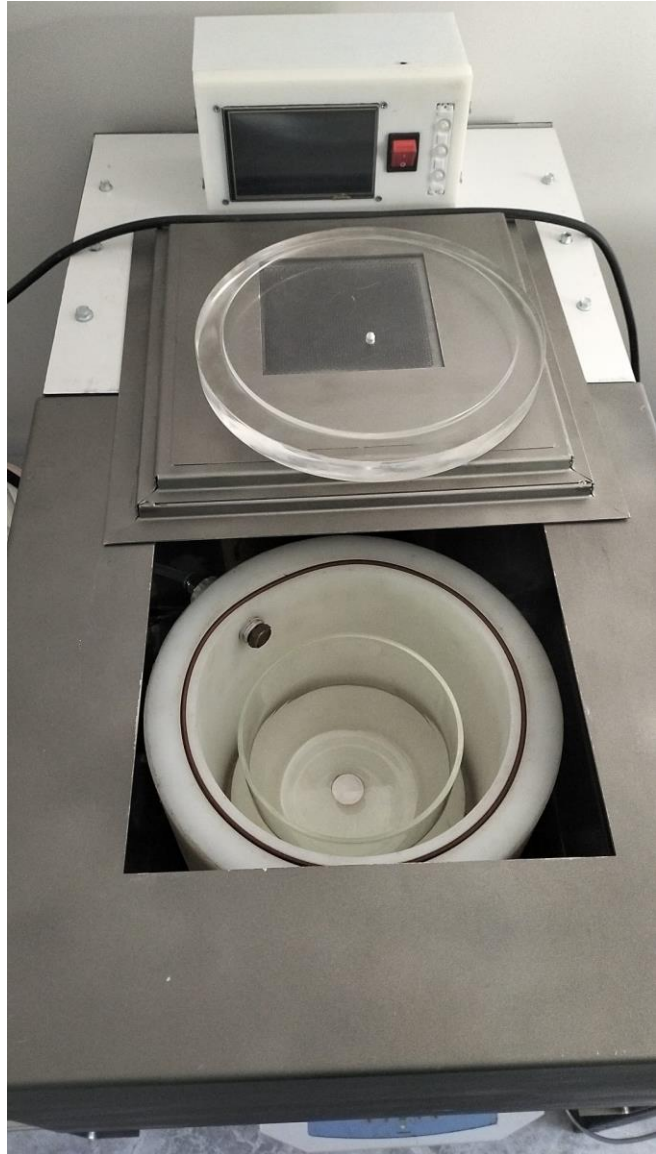
Conventional oven drying



At 95°C for 4 h

$a_w \sim 0.83$

MW-Vacuum



MW-Vac for 8-10 min
Specifications:
2 kW, 50% power,
150 mmHg

aw < 0.65

Results – preparation step



without pectin



with pectin

Pectin is necessary for gelation before processing

Snack bar enriched with pea protein isolate

- Positive effect on rheology
- Acceptable texture of final product
- Increased protein content
- Acceptable taste



Rubisco



Expected FunTomP Products



Tomato Bars



Leather



Juices & Sauces

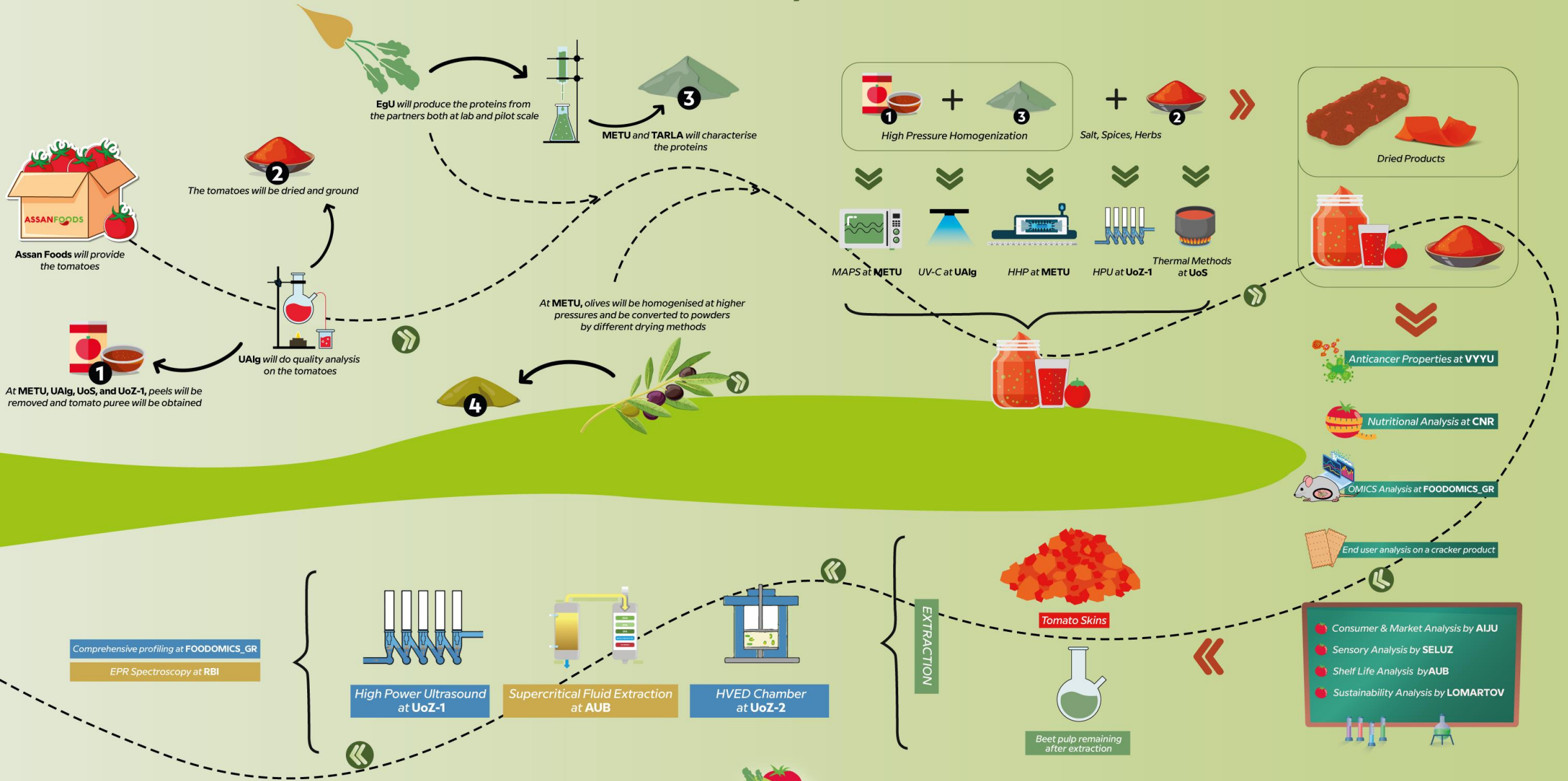


Dry Mixes

Mediterranean Diet

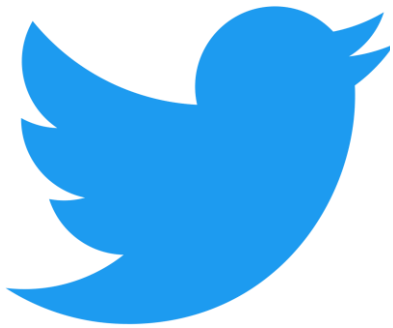


Visual Summary of FunTomP



Thank you!

<https://funtomp.com/>



As FunTomP



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