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always on, always nature

Biotechnology-based company dedicated to the valorization of natural products.

**Services catalogue**



## About Us

Tree Flowers Solutions (TFS) is a biotechnology-based company specialized in the valorization of natural products through the development and optimization of extraction and concentration processes of bioactive compounds.

With a strong focus on technological efficiency and sustainability, TFS converts plant-based raw materials into high-quality extracts, applying controlled extraction, concentration, and drying processes.

TFS is committed with innovation based on applied research, leading to tailored solutions to each partner's requirements.



TFS exports to over 18 countries across 4 continents



With active partnerships with more than 5 R&D entities, aiming to develop innovative solutions and products, having a project portfolio composed by 8 finished projects and several ongoing.



Política de Qualidade

Tree Flowers Solutions is committed to continuous improvement and excellence in its activities related to tannin production and the provision of advanced services, including extraction, water and solvent concentration, spray-drying, packaging, and freezing. Through its Quality Management System (QMS), the company seeks to meet the expectations of clients and stakeholders, ensuring compliance with applicable requirements. The QMS is currently under development and implementation.

## Our Global Market

- ✔ TFS expanded its operations to 18 countries in just two years, positioning its gold product CHESTWINE® together with other company solutions, in strategic markets, at worldwide level.
- ✔ This global presence results in the enrichment of TFS knowledge across diverse winemaking contexts, which is essential for the development of tailored solutions to specific needs, and ensures compliance with internationally recognized standards of quality and sustainability.



### EUROPE

Portugal, Spain, France,  
Italy, Switzerland

### EUROPE

Belgium, Georgia, Croatia,  
Greece, Austria, Romania

### AMERICA

North America, Brazil,  
Argentina

### ASIA:

China, Bhutan

### AFRICA:

South Africa

## Our Services

TFS offers to its partners and clients a comprehensive range of specialized services of natural extracts production, supported by proprietary technology and the scientific expertise of its team. Each service is tailored to the specific standards and requirements of each client/project.



Aqueous and Hydroalcoholic Extraction of Plant-Based Raw Materials.



Liquid Extracts Concentration through Reverse Osmosis.



Liquid Extracts Concentration and Solvent Recovery (Organic Solvents).



Spray-Drying for the Production of Powdered Extracts.



Processes Development and Optimization at Pilot Scale.

## Equipment and Technical Capabilities

TFS's industrial unit is equipped with a range of pilot-scale equipment that enables extraction, concentration, and drying of natural extracts, ensuring quality and efficiency.

### Forced-Percolation Extractor

**Function:** Extraction of bioactive compounds from plant-based raw materials through forced solvent circulation, enhancing mass transfer efficiency.

**Capacity:** Up to 50 liters per cycle, suitable for both pilot trials and semi-industrial production.

**Applications:** Preparation of aqueous or hydroalcoholic extracts for subsequent concentration or drying.

**Key Features:** Efficient and controlled process, enabling optimization of extraction yields while preserving sensitive compounds.

CAPACITY  
50 L

TYPE  
Extraction

EFFICIENCY  
Controlled

# Concentrator

## Microfiltration Unit and Reverse Osmosis Unit

**Function:** Concentration of liquid solutions through semipermeable membranes, enabling controlled removal of the water avoiding thermal processes.

**Capacity:** Modular system with a capacity of 250L/h, depending on the configuration and the viscosity of the extract solution.

**Applications:** Concentration of aqueous plant extracts, preserving heat-sensitive compounds and improving final yield.

**Key Features:** Automatic operation, continuous quality monitoring, and high energy efficiency.

CAPACITY  
250 L/h

TYPE  
Modular

EFFICIENCY  
Automatic

## Concentration and Solvent Recovery Equipment – IST

**Function:** Recovery and purification of organic solvents (e.g., ethanol) by vacuum distillation, enabling extracts concentration and the reuse of the separated solvents in new extraction cycles.

**Capacity:** Up to 200L per cycle, with an average recovery rate of 50–70L/h.

**Applications:** Suitable for high thermal stability extracts' concentration. Solvents recycling and reuse in extraction processes.

**Key Features:** Automatic operation via vacuum distillation, multi-temperature digital control, internal anti-static scraping system, high energy efficiency, and ATEX certification.

CAPACITY  
**200 L**

TYPE  
**Distillation**

EFFICIENCY  
**Automatic**

## Spray Dryer – Spray Drying

**Function:** Conversion of liquid extracts into dry powders through atomization and rapid drying under a hot air stream.

**Capacity:** Up to 5kg/h, depending on the feed formulation and drying parameters.

**Applications:** Production of stable powdered extracts, nutraceutical ingredients, food additives, and long-lasting solutions.

**Key Features:** Precise temperature control, production of fine particles, while preserving bioactive properties.



## Analytical Resources

The analytical resources installed allows the chemical and microbiological characterization of a wide range of parameters for different industries, from wine, till pharmaceutical, food, environmental, chemical, polymers, or even for scientific research purposes.

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## Chemical Resources



Quantification of total phenolic compounds by spectrophotometry.



Quantification of proteins by spectrophotometry.



Determination of antioxidant activity (free radical scavenging and reducing power).

## Y15 Automatic Enology Analyzer from Biosystems

**Function:** Allows the analysis of more than 60 oenological parameters, being extended also to food analyses.

**Capacity:** Can support up to 150 tests per hour, allowing the simultaneous analysis of 72 samples.

**Applications:** Oenological analyses include organic acids, sugars, nitrogenous compounds, sulfites and metallic ions, acidity, polyphenols, color and glycerol.

**Key Features:** Allows the optimization of working times with increased efficiency.

CAPACITY  
150 Tests

TYPE  
Analysis

EFFICIENCY  
High

## High-Performance Liquid Chromatography equipped with a Diode Array Detector (HPLC-DAD, Shimadzu) and a Nucleosil 100-5 C18 column

**Function:** Allows the selective separation and quantification of the different components contained in a sample. The detector allows the simultaneous response monitoring at different wavelengths.

**Capacity:** Equipped with an automatic sampler with a capacity for 162 samples. Other detectors (refractive index, fluorescence, etc.) and additional columns can be installed depending on the intended application.

**Applications:** Detects impurities, quantifies active compounds (pharmaceuticals, cannabis, vitamins, cosmetics), analyzes beer composition, and characterizes polymers through molecular weight and polydispersity measurements. ersity index.

**Key Features:** Capacity for a simultaneous multiple detection due to the monitoring of a wavelengths array. Generates a 3D spectrum by combining retention time, signal intensity and absorption spectrum.



## UV-Vis spectrophotometry

**Function:** Colorimetric analysis and quantification of bioactive compounds in a sample.

**Capacity:** Three types of analyses per sample.

**Applications:** Quantification of total phenolic and protein contents, evaluation of the antioxidant activity (DPPH and reducing power methodologies).

**Key Features:** Rapid analysis of a product bioactivity, under a wide range of wavelengths, with high sensitivity and accuracy, being a versatile applications.

CAPACITY

3 Types Analysis

TYPE

Quantification

EFFICIENCY

Rapid

## Microbiology

TFS offers its partners and clients a range of specialized services in the processing and analysis of food and cosmetic products.

Microbial load assessment for natural extracts, food, and cosmetic products.

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### Why analyze the microbial load?



Ensures food quality



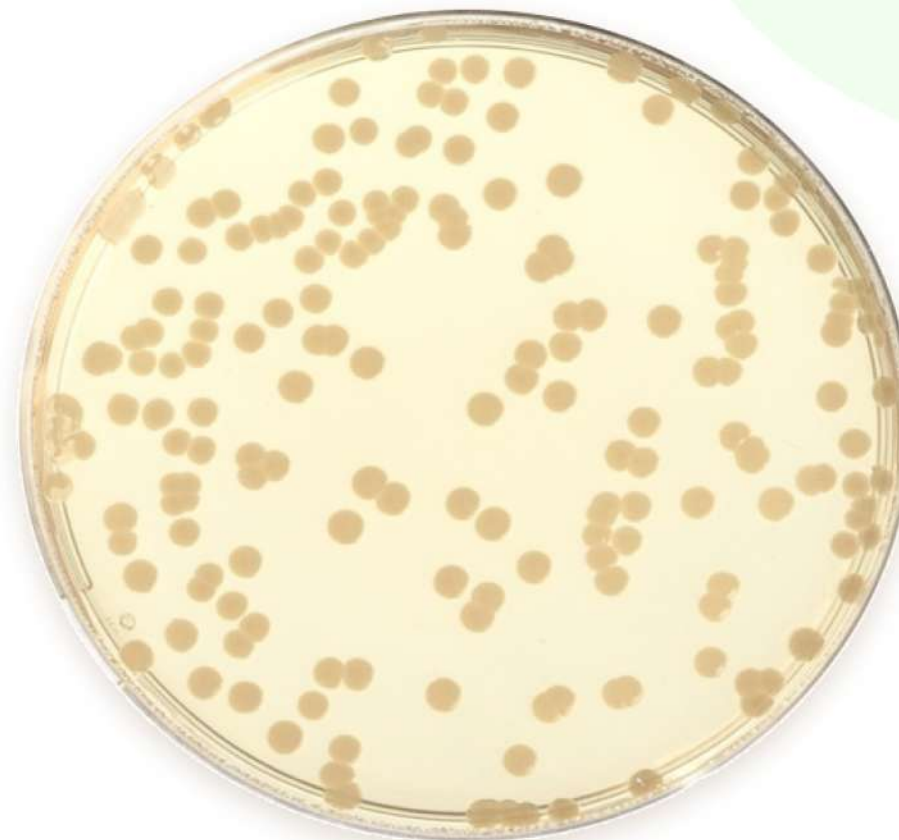
Prevents contamination;



Ensures compliance with ISO standards;

## Microbiology – Microbial Load

- ✓ Total Aerobic Mesophiles  
ISO 4833-1:2013
- ✓ Yeasts & Molds  
ISO 21527-1:2008 e ISO 21527-2:2008
- ✓ Coliforms  
ISO 4832:2006
- ✓  $\beta$ -Glucuronidase-Positive *Escherichia coli*  
ISO 16649-2:2001
- ✓ *Staphylococcus Aureus*  
ISO 6888-1:2021
- ✓ Mesophilic Lactic Acid Bacteria  
ISO 15214:1998
- ✓ *Salmonella spp*  
ISO 6579-1
- ✓ *Listeria monocytogenes* & *Listeria spp*  
ISO 11290-1:2017, ISO 11290-2:2017
- ✓ *Enterobacteriaceae*  
ISO 21528-2:2017



## Cosmetic Products

✓ Total Aerobic Mesophiles  
ISO 4833-1:2013

✓ Yeasts & Molds  
ISO 21527-1:2008 e ISO 21527-2:2008

✓ *Escherichia coli*  
ISO 21150:2006

✓ *Staphylococcus Aureus*  
ISO 22718:2006

✓ *Pseudomonas Aeruginosa*  
ISO 22717:2006

✓ *Candida Albicans*  
ISO 18416:2007



## Marketing Solution for Wine Sampling

- ✔ **Efficient presentation of wines at events**  
Small-format samples preserve organoleptic profile and ensure safety.
- ✔ **Inert gas filling technology**  
Minimizes oxygen exposure, maintaining wine integrity.
- ✔ **Ready-to-use samples**  
50 ml and 100 ml tubes prepared for transport, tastings, and distribution.
- ✔ **Custom identification & presentation**  
Labeling solutions and premium boxes for organized, professional display.





 [treeflowerssolutions.com](https://treeflowerssolutions.com)

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