



Joint Project Seminar 16th & 17th November Brussels



Mild Innovative Treatment for Wine Stabilization: the MI-WINE Project

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Brussels



Background of the Project

- Modern oenology is oriented towards placing stable wines on the market

MAIN ISSUES TO BE ADDRESSED:

Protein instability → turbidity, deposits

- ✓ Current solution: batch treatments (i.e., bentonite)
- ✓ Disadvantages: discontinuous processes, the need for filtration-transfer, large waste production.



Oxidative decay → browning, off-flavors

- ✓ Current solution: antioxidants (i.e., SO₂)
- ✓ Disadvantages: allergenicity of sulfur dioxide, gradual consumption of antioxidants in bottles.



Key issues underlying the MI-WINE innovative approach:

- ✓ Boosting a sustainable food/oenological industry
- ✓ Promoting green and circular approaches to minimize the impact of the industrial practices
(PILLARS: Environment – Economy – Society)
- ✓ Traditional expectation meets technological innovation:
 - Minimizing wastes
 - Increasing customer's awareness
 - Improving wine quality



Holistic paradigm of sustainability in the oenological industry

The MI-WINE PROJECT

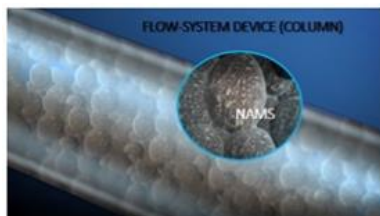
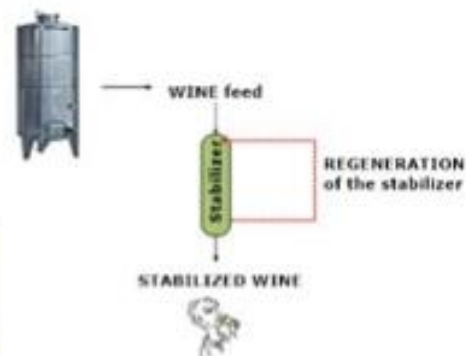
SUSFOOD2 – Core Organic Topic 3: Mild food processing

Starting date: November 1st 2020

Project Duration: 36 months

The MI-WINE Project aims to develop a **treatment in a continuous flow regime**, exploiting the properties of a **highly performant sorbent material**, combined with a **device and a protocol** optimized to ensure a **high efficiency wine stabilization system with reduced environmental impact**.

MI-WINE FLOW-SYSTEM



WORK PACKAGES: 6

Final MI-WINE outcome:

delivering of a mild process lab flow-system (TRL4) to be validated versus specific **Key Performance Indicators (KPIs)**: technical, economic, production advantages and social benefits

The Project Consortium

Department of
Agricultural and
Food Sciences -
University of
Bologna, Italy



**Project
Coordination** (WP1)
and development of
the mild-treatment
(WP4)



Prof.
Giuseppina P.
Parpinello

Institute of Science
and Technology for
Ceramic Materials –
ISTEC-CNR, Italy



SWOT analysis
(WP2); study and
development of
innovative
adsorbing materials
(WP3)



Dr. Anna
Luisa
Costa

Department of
Chemistry- Wrocław
University of
Environmental and
Life Sciences, Poland



Assessment of
chemical-physical
quality and stability
(WP5)



Prof.
Antoni
Szumny

Institute for
Viticulture and
Oenology - DLR
Rheinpfalz,
Germany



SWOT analysis
(WP2); Sensory:
quality –
preferences
evaluation (WP5)



Prof.
Ulrich
Fischer

MID-TERM RESULTS

LIST OF CERAMIC MATERIALS TESTED AS WINE PROTEIN ABSORBERS

Product	Dimensions	Producer	Results
TiO ₂ P25	nanometric	DEGUSSA	SELECTED ✓
SiO ₂	micrometric nanostructured	Grace	dismissed
TiO ₂ @SiO ₂	micrometric nanostructured	Lab. Nanomateriali CNR-ISTEC	interesting
Idrotalcite sintetica	nanometric	Sigma Aldrich	dismissed
ZrO ₂ TZ 12 CE	micrometric, nanostructured	Tosoh Corporation	very interesting
ZrO ₂ Harshaw sp 103	nanometric	Harshaw	very interesting
Polyurethane spheres	micrometric, nanostructured	<i>Commercial sample</i>	dismissed
Polyethylene spheres	micrometrics	Sigma-Aldrich	dismissed

WP2 – WP3 RELEVANT ACTIVITIES

DEVELOPMENT AND VALIDATION OF A FLOW-SYSTEM DEVICE FOR WINE STABILIZATION



- Supply tank AISI 304
- Thermochiller refrigeration system (8-16° C)
- Food-grade peristaltic pump equipped with a 0.45 µm CA filter
- Electrical panel AISI 304 stainless steel in watertight case (P, flow rate and temperature control)

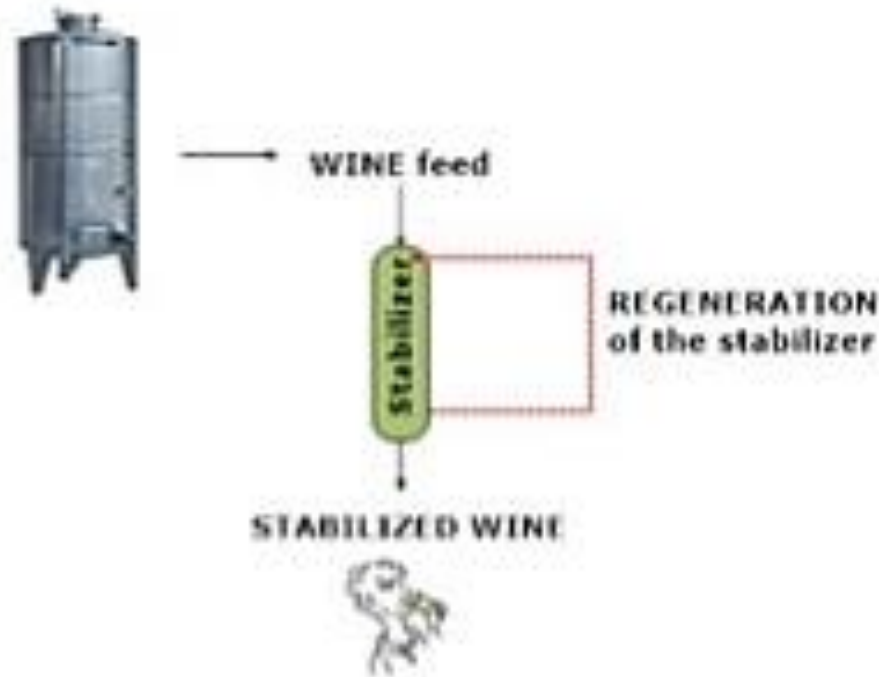


**Theoretical capacity of the prototype:
up to 20 L wine**

WP4 RELEVANT ACTIVITIES

The TRL4 Lab scale, flow-system prototype

MI-WINE FLOW-SYSTEM



Key elements selected for engineering and performances validation of the technology

Optimum adsorbent material:wine volume (w/v)

Optimum processing time (hours)

Flow rate (L/h)

Theoretical cycles (nr)

Maximum protein adsorption capacity (Langmuir isotherm and constant)

WP4 RELEVANT ACTIVITIES

....what's next?

- **Sorbent material:** integration in the lab flow system (WP4) regeneration performance in relevant environment, scaling up and improvement of the sustainability of the proposed technology (**WP3**).
- **Lab flow-system:** process and performances validation; pilot experiments on different unstable white wines (**WP4**).
- **Months 26 – 36:** Chemical and sensory analyses; comparison of the absorption characteristics for proteins as well as aroma compounds in the developed ceramic material versus the standard bentonite clays (**WP5**).

Work Package 6: Dissemination and communication (Months 6-36)

Project website:

<https://susfood-db-era.net/main/MI-WINE>

Mid-Term Dissemination activities:

- Kick-off project meeting - February 2021: Pitching the MI-WINE Project: MILD INNOVATIVE TREATMENT FOR WINE STABILISATION.
- Marina Serantoni, Ilaria Zanoni, Anna Luisa Costa, Wine fining: study on nanostructured mesoporous titania thin layers for adsorption of low molecular weight wine proteins, Nano-week & NanoCommons Final Conference -EU NanoSafety Cluster projects, Cyprus, 20 – 24 June 2022. Poster session and Conference proceedings.
- Giuseppina Paola Parpinello, Arianna Ricci, Carolina Pavez Moreno, Luigi Ragni, Andrea Versari. New device for protein stabilization of white wines throughout a continuous flow system , 43rd World Congress of Vine and Wine - International Organization of Vine and Wine (OIV), 31 October – 4 November 2022, Ensenada, Baja California, Mexico. Oral presentation.
- Mid-Term project meeting – November 2022: – Online presentation.

Thank you for your attention

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10 year anniversary – 16/17 June 2022 - Brussels