

VINE LEAVES HARVESTING AND UTILIZATION FOR NUTRACEUTICAL PURPOSES

VINE LEAF FOR LIFE PROJECT

Giulia Santunione¹, Filippo Ottani², Nicolò Morselli², Marco Puglia², Giovanni Nigro³, Matteo Mora⁴, Giulio Allesina^{2,5}, Simone Pedrazzi^{2,5*}

¹ Department of Life Science (Agro-Food Science Area), BIOGEST – SITEIA Interdepartmental Centre, University of Modena and Reggio Emilia - Piazzale Europa 1A, Reggio Emilia, Italy.

² Department of Engineering “Enzo Ferrari” - University of Modena and Reggio Emilia – Via Vivarelli 10/1, 41125, Modena, Italy.
³ RI.NOVA Soc. Coop. - Via Dell'Arrigoni120, Cesena (FC), Italy.

⁴ CANTINE RIUNITE & CIV - Via Brodolini 24, Campegine (RE), Italy.

⁵ INTERMECH - Inter-departmental Center, University of Modena and Reggio Emilia, Via Vivarelli 2 – 41125 Modena, Italy.

*Corresponding Author: simone.pedrazzi@unimore.it

INTRODUCTION

Vitis vinifera L. is one of the most important and cultivated species in the world, includes numerous cultivars with different phenological and qualitative characteristics. Although, wine and grapes represent the best known and most valuable products, various other products also derive from the vine plant, among the most abundant of which are vine leaves, a rich source of vitamins, minerals, crude fiber and phenolic compounds.

These are considered a real treasure chest of health and delicacy in many Mediterranean countries, such as Turkey, Greece and Bulgaria where specific varieties are grown for the consumption of fresh and preserved leaves.

Recently, the growing search for healthier diets and new health products has placed vine leaves in the spotlight in Italy as well. In fact, they contain numerous bioactive molecules, in particular phenolic substances capable of protecting and delaying oxidative processes. Among the various beneficial properties for human health, these secondary metabolites of the leaf show a protective effect against the development and progression of pathological conditions such as cancer, ageing, cardiovascular problems and diabetes.

Due to the growing interest in the consumption of vine leaves, some studies have also focused on their culinary use and on the processes necessary to preserve their health properties during the food processing phases. Furthermore, their use in healthy infusions is spreading more and more. This scientific and applicative approach is in line with the constant regulatory evolution that is affecting products intended for food integration and the use of natural substances in food preparation (1924/2006/EC).

For companies in the nutraceutical, food, cosmetic and pharmaceutical sectors, the possibility of having access to new sources of biomolecules of dietary - healthy interest, from vine leaves, therefore represents a significant boost and a strategically important tool for providing the market with answers able to satisfy the current growing demand. However, in Italy, at present, these companies source red vine leaves almost exclusively from foreign countries (e.g. Spain, France, etc.).

MATERIALS AND METHODS

In this context, considering the vast regional ampelographic base, the Emilia-Romagna winery is offered an important opportunity for product diversification and, therefore, a new source of income, especially if it is part of a cooperative group that acts synergistically in a certain area, on the basis of specific supply chain agreements. Once the local vine varieties of interest have been identified, it is necessary to proceed with an objective characterization of the leaves that allows us to understand their most valuable intended use. Furthermore, for the producer who intends to diversify his income with the transformation and sale of the harvested leaves, it will be necessary to adopt strategies to defend the vineyard which allow the use of the leaves for dietetic - health purposes (treatments with products with low residuals), for which adequate technical-agronomic support is required. Finally, it is essential to implement innovative methods of mechanized harvesting of the leaves, which guarantee their integrity and preserve their properties, as well as respecting the physiology of the vine.

VINE LEAF FOR LIFE is a on-going research project funded by the Emilia-Romagna region focused to the development of an integrated approach that will allow the beneficiary company Cantine Riunite & CIV to open up to its members a privileged sales channel for highly specialized products, improving supply chain relationships. The project has the duration of 18 months, it was started on 28th September 2022 and it will finish on the 28th of March 2024. The general objective of the VINE LEAF FOR LIFE project consists in objectively characterizing vine leaves of local varieties, harvested mechanically with an innovative machine, to be used for the extraction of nutraceutical compounds, for the development of new dietetic-health products capable of increasing profit for the winery industries. In particular, the working will focus on the following specific objectives:

a) Characterization and use of grape variety leaves for the extraction of active ingredients for nutraceutical use;

b) Design and implementation of an innovative mechanized system for the recovery of vine leaves to be used for nutraceutical purposes;

c) Evaluation of the corporate defense strategy and of the residual nature of the active ingredients used on the leaves;

d) Market analysis and new methods of marketing vine leaves and verification of the qualitative perception by the consumer.

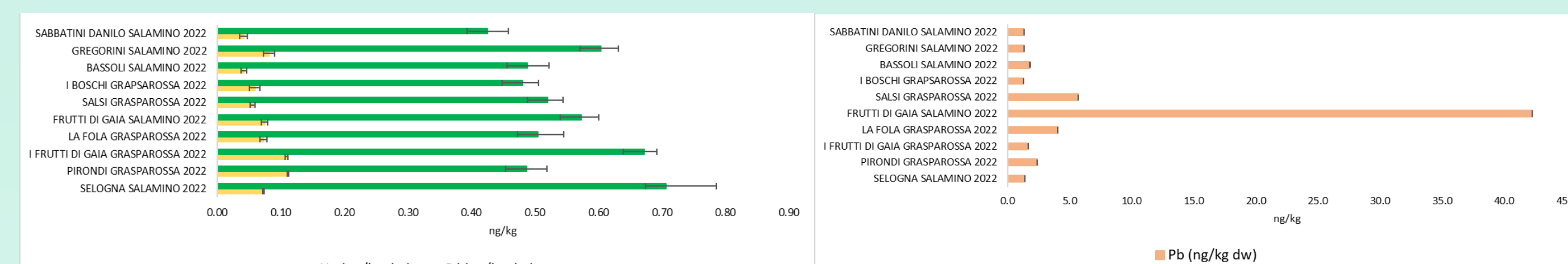
RESULTS

- **Characterization of grapevine leaves from local varieties functional to the extraction of nutraceutical compounds;**

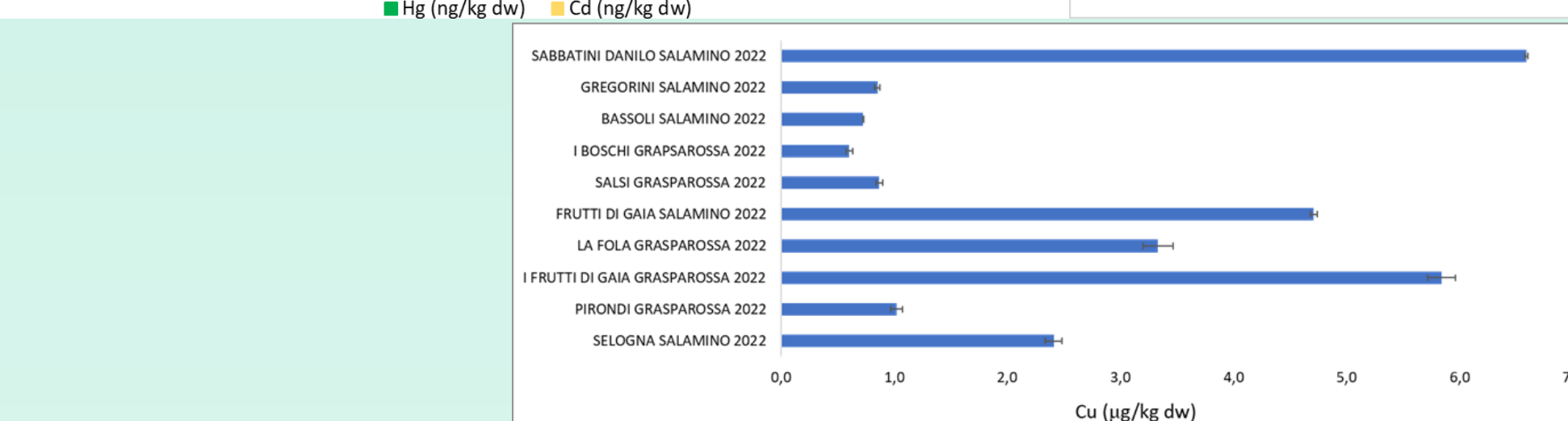


Leaves sample (% wt.)	N %	C %	H %	S %	% ash	%moisture
SELOGNA SALAMINO 2022	1.41	47.69	5.99	----	7.97	60.96
PIRONDI GRASPAROSSA 2022	1.24	46.27	5.67	----	10.52	67.51
I FRUTTI DI GAIA GRASPAROSSA 2022	1.56	48.49	6.11	----	9.80	67.33
LA FOLA GRASPAROSSA 2022	1.51	48.5	6.04	----	7.71	61.93
FRUTTI DI GAIA SALAMINO 2022	1.44	46.62	5.88	----	10.21	59.00
SALSI GRASPAROSSA 2022	1.25	46.68	5.84	----	11.26	65.58
I BOSCHI GRASPAROSSA 2022	1.84	50.35	6.54	----	8.74	67.74
BASSOLI SALAMINO 2022	1.17	45.48	5.92	----	10.45	63.26
GREGORINI SALAMINO 2022	0.98	46.25	5.57	----	11.36	66.69
SABBATINI DANILO SALAMINO 2022	1.5	46.51	6	----	5.09	57.31

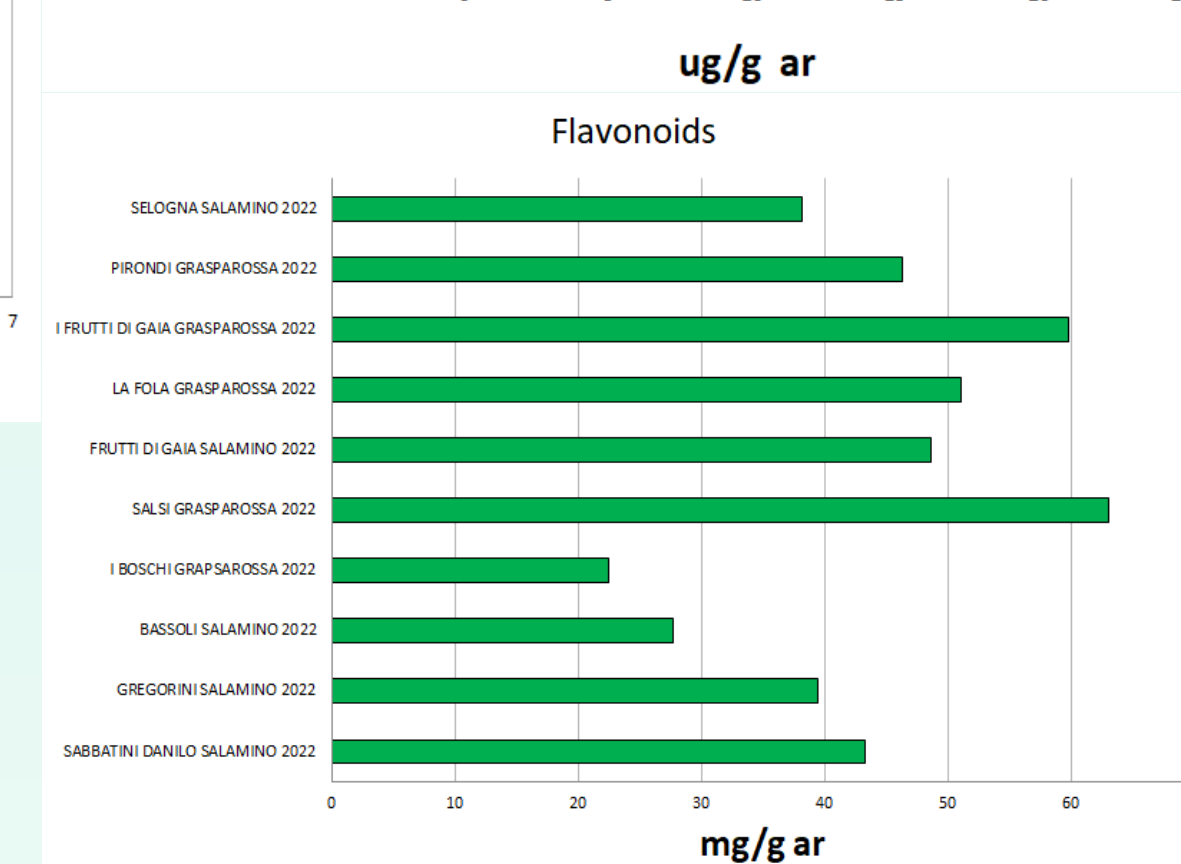
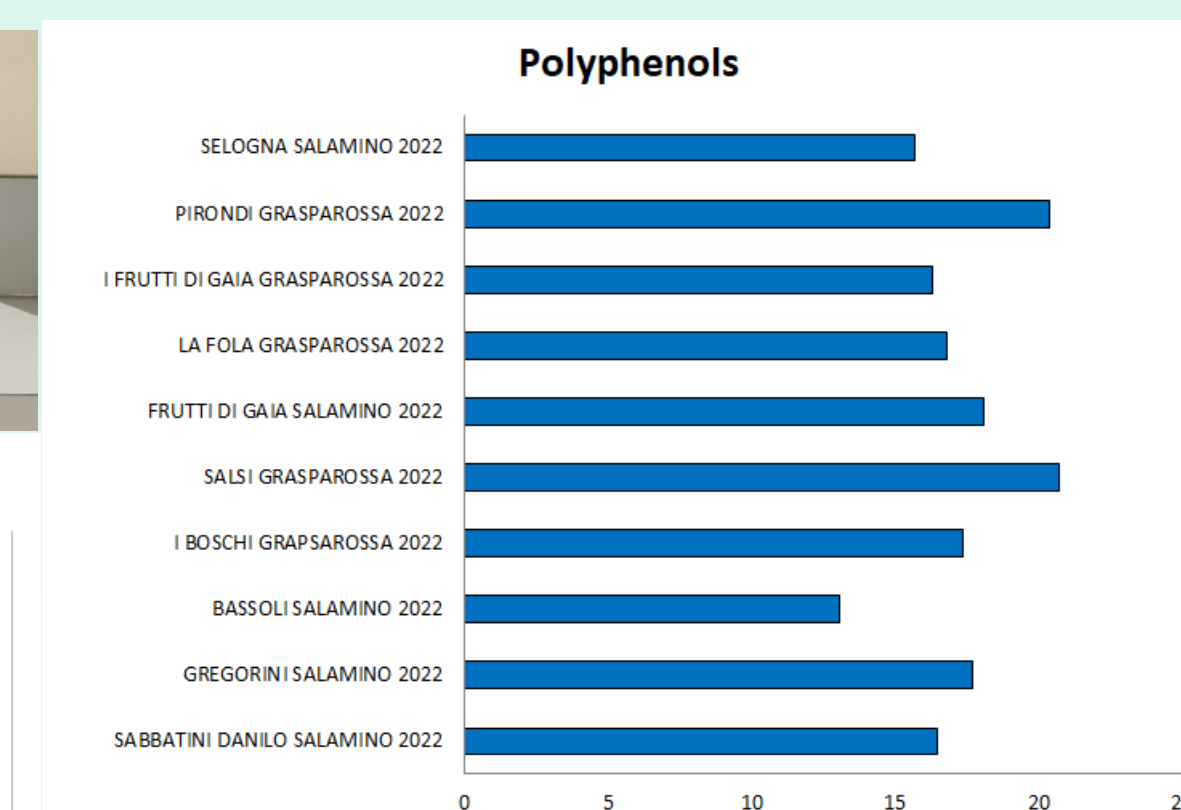
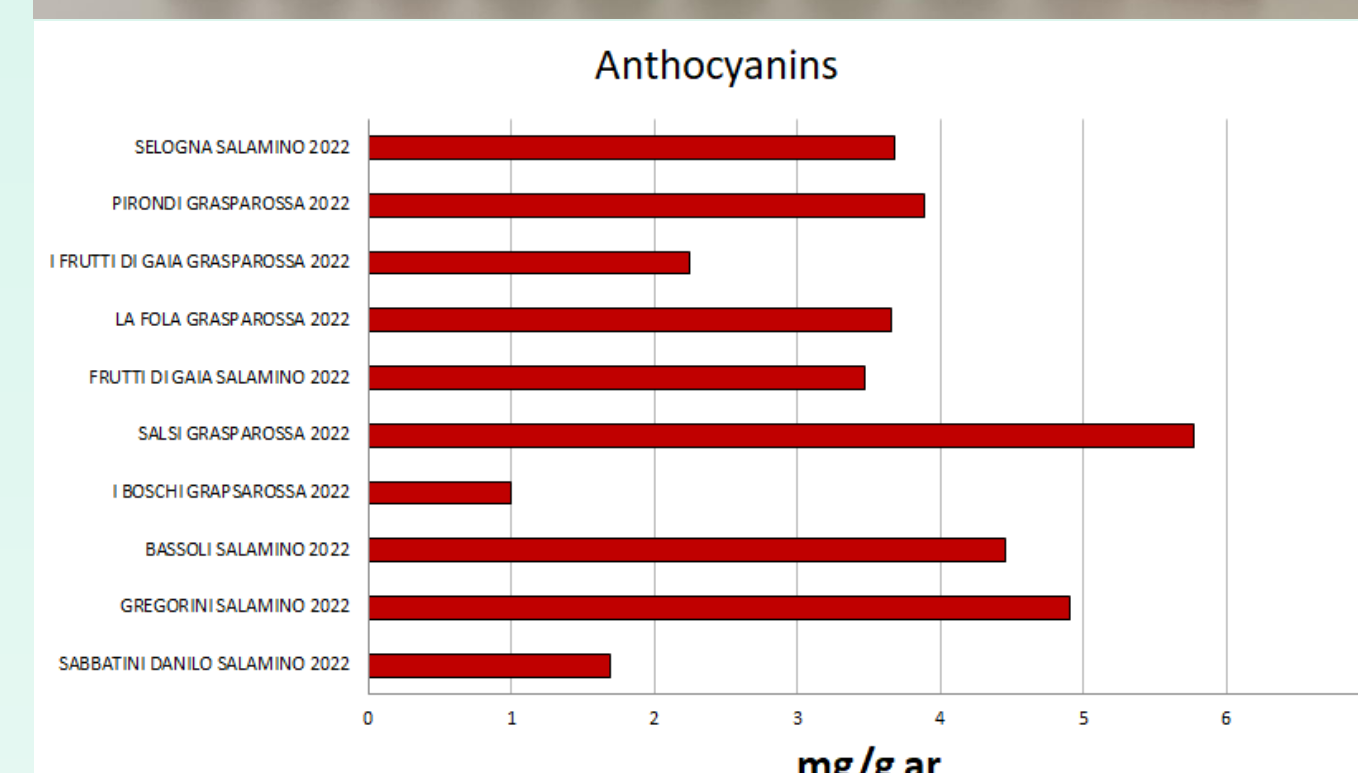
Heavy metals content (limits CE n. 1881/2006 for vegetables)
Cd < 50000 (ng/kg dw); Hg (no indication); Cu < 100 (µg/kg dw); Pb < 10000 (ng/kg dw);
Method: mineralization + ICP - MS



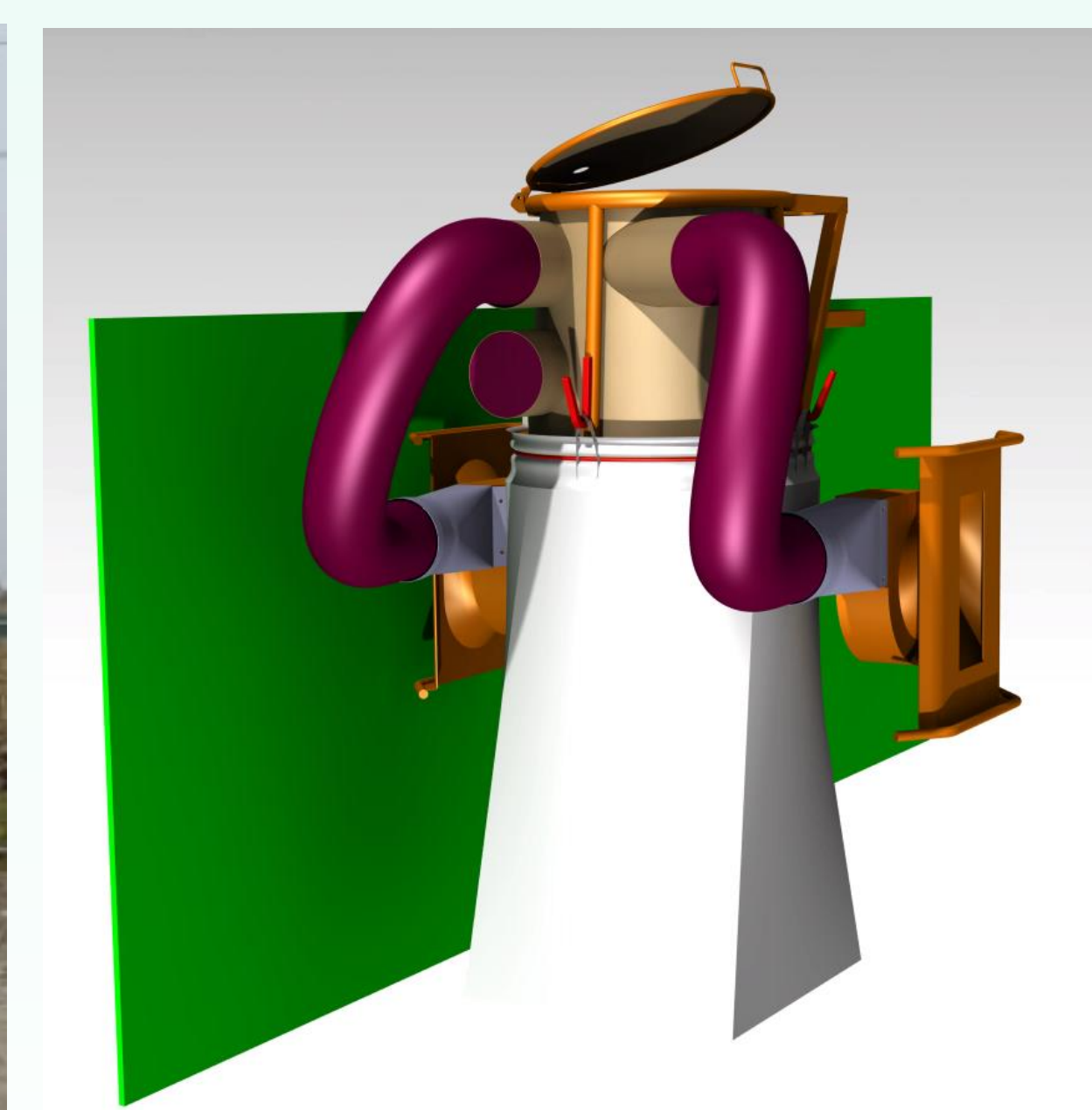
Leaves samples chemical analysis



Active ingredients (Polyphenols, Flavonoids and Anthocyanins)



- **Implementation and optimization of a prototype for the mechanized harvesting of grapevine leaves to be used for the extraction of nutraceutical compounds;**



Leaves harvesting prototype and re-design

FUNDING

Progetto di Filiera “VINE LEAF FOR LIFE - Individuazione di principi attivi a uso nutraceutico in foglie di vite e meccanizzazione della loro raccolta in vigneto” - CUP: E39H22000000007, Bando DGR N. 2286/2022 – Misura 16.2.01”

CONTACTS

simone.pedrazzi@unimore.it - www.beelab.unimore.it

Context

Project goals and objectives