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GOOD PRACTICES OF CIRCULAR ECONOMY WORLDWIDE IN AGRICULTURE AND THE WINE SECTOR. LESSONS FOR ROMANIA

Cătălin Alexandru Bîtea[1,2], Ioana Mihaela Bălan[1,*], Nicoleta Mateoc-Sîrb[1,3]

[1]University of Life Sciences “King Mihai I” from Timisoara, Romania; [2]Doctoral School “Plant and Animal Resources Engineering”, Timisoara, Romania; [3]Romanian Academy, Branch of Timisoara, Romania

*Corresponding author: ioanabalan@usvt.ro | First author: catalin.bitea@usvt.ro

Abstract: *The paper identifies and compares good practices of circular economy worldwide in agriculture and the wine sector and derives lessons for Romania. A qualitative comparative case analysis was applied to peer-reviewed literature, official documents and corporate reports. Four governance models were distinguished: the regulatory–network model (France, Portugal), the cooperative cascade model (Caviro, GRAP’SUD), the corporate closed-loop model (Tarac Technologies, Australia) and the community-based model of smallholder circular agriculture. Their success rests on aggregation of by-product flows, cascade valorisation, a stable regulatory framework and market diversification. For Romania, cooperation between wineries, a dedicated framework for winery by-products and evaluation of economic and social impacts emerge as priorities.*

• Introduction

The circular economy is a key instrument for the Sustainable Development Goals: its practices can contribute directly to 21 SDG targets and indirectly to another 28. In 2025, the world vineyard covered 7.0 million ha and wine production reached 227 million hl; at about 0.16 kg of pomace per litre, this means more than 3.6 million t of grape pomace per year.

Aim: to identify and compare good practices of circular economy worldwide in agriculture and the wine sector, and to derive lessons for Romania.

• Material and method

Qualitative comparative multiple-case analysis, carried out within the second doctoral research report. Cases were selected for:

- operation at real scale and verifiable quantitative data
- diversity of governance models and regions (Europe, Australia, sub-Saharan Africa)
- relevance for the Romanian wine sector

Sources: peer-reviewed articles, EU and Portuguese legal texts, French and South Australian parliamentary documents, FranceAgriMer, UN DESA, OIV and corporate reports; each value was checked against a primary source.

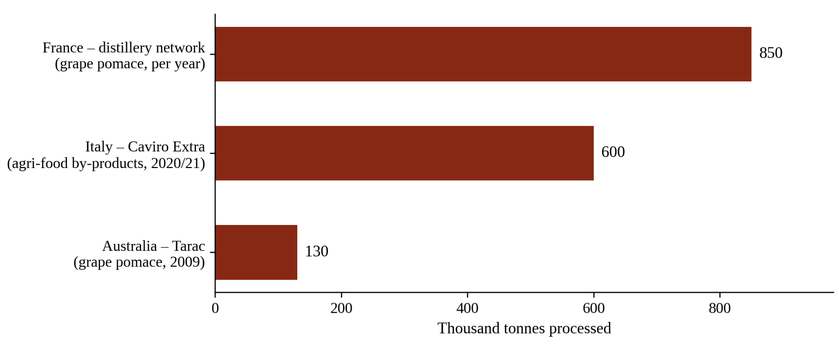


Fig. 1. Annual volumes of by-products processed in the analysed cases (source: Assemblée nationale, 2026; Gruppo Caviro, 2022; Parliament of South Australia, 2011)

Table 1. Good practices in the wine sector

Case	Model	Key results
France – distillery network	Regulatory–network	75 distilleries; 93–99% of pomace distilled; >2,000 jobs
Portugal – Portarias 134 and 236/2023	Regulatory	Mandatory elimination; raw alcohol ≥92% vol.
Italy – Caviro	Cooperative cascade	~600,000 t by-products; 50,000 t soil improvers
France – GRAP’SUD	Cooperative cascade	1,170 hl alcohol/day; spirits, colourants, seed oil
Australia – Tarac	Corporate closed loop	~130,000 t pomace; 102 ML water for vineyards

Source: own synthesis based on the cited sources

• Results and discussions

Circular agriculture. Mixed farming, organic farming, agroforestry and wastewater reuse create rural jobs, especially for women; in sub-Saharan Africa, co-designed biochar business models turn residues into new income.

Regulatory–network model. In France, over 850,000 t of pomace and 1.4 million hl of lees are distilled each year, but 70–75% of the alcohol goes to biofuel, whose price fell by almost 50%.

Cooperative and corporate models. Caviro and GRAP’SUD aggregate by-products from many growers; Tarac closes the loop by combining material, energy and water flows (Table 1, Fig. 1).

Economic scale. The best valorisation route depends on processing capacity (Table 2).

Table 2. Processing capacity and recommended grape pomace routes

Capacity	t/day	Best routes	Routes to avoid
Small: <0.1 kg/s	<8.6	High-value products (tannins, extracts)	Energy-only routes
Intermediate	8.6–864	Tannins; anaerobic digestion	Combustion, gasification, pyrolysis
Very large: >10 kg/s	>864	Integrated biorefineries	Pyrolysis

Source: own processing based on Taifouris et al. (2023)

Table 3. Success factors and lessons for Romania

Success factor	Evidence	Lesson for Romania
Clear legal framework	France, Portugal	Dedicated rules for winery by-products
Cooperative aggregation	Caviro, GRAP’SUD	Collective collection between wineries
Cascade portfolio	Caviro, Tarac	High-value products first, energy last
Water and energy integration	Tarac	Reuse of treated winery wastewater
Market diversification	France	Avoid a single dominant outlet

Source: own synthesis based on the analysed cases

• Conclusions

- four governance models: regulatory–network, cooperative cascade, corporate closed-loop and community-based
- scale and aggregation of by-products are decisive for profitability
- dependence on a single market exposes circular models to price shocks
- Romania needs a dedicated framework and cooperation between wineries
- the lessons will be tested in the Cramele Recaș case study

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