vinetur

Natural Solvents Unlock Vine Waste’s Hidden Resveratrol Riches

A study found NaDES extracted key stilbenoids from bark and tendrils far better than ethanol and other standard solvents.

Monday, August 3, 2026



Researchers have reported that natural deep eutectic solvents, known as NaDES, may offer a more efficient and more sustainable way to extract valuable stilbenoid compounds from vine by-products such as bark and tendrils, according to a study

published in the Journal of Chromatography A and indexed by PubMed.

The work focused on stilbenoid polyphenols found in vine material left over from vineyard operations. These compounds, which include trans-resveratrol and trans-ε-viniferin, have drawn attention because of their antioxidant, anti-inflammatory and antimicrobial properties. The study examined whether NaDES, a class of solvents made from natural metabolites, could improve extraction compared with conventional solvents commonly used in laboratories and industry.

The researchers tested 11 NaDES formulations and selected trans-ε-viniferin as a model stilbenoid for the initial screening. They found that the components most effective at dissolving that compound were choline chloride, proline, glycerol and glucose. According to the study, the best-performing pure NaDES already surpassed ethanol in their ability to solubilize trans-ε-viniferin.

The gains became larger when water was added to the solvent mixtures. After optimizing composition with water levels of up to 50%, the researchers reported a marked increase in solubilization, reaching more than 13 mg/mL. That represented more than a 100-fold increase compared with ethanol under the conditions described in the paper.

The team then moved from solubility testing to extraction trials using ultrasound-assisted extraction on bark and tendrils from Vitis vinifera. The extracted compounds were measured with HPLC-DAD and UHPLC-HRMS, two analytical techniques used to identify and quantify chemical substances with high precision.

In those extraction tests, NaDES made from proline-acid mixtures delivered significantly higher recoveries of trans-ε-viniferin, trans-resveratrol and other stilbenoids than conventional solvents including ethanol, acetone and ethyl acetate, the study said. The findings suggest that these solvent systems can improve the recovery of compounds that are present in woody vine residues often treated as low-value agricultural waste.

The research adds to a broader push to find greener processing methods for agricultural by-products. Vineyards generate large volumes of pruned canes, bark and tendrils each season, and much of that material has limited commercial use. By showing that naturally derived solvent systems can outperform standard organic solvents in this setting, the study points to a possible route for turning vineyard residues into higher-value ingredients.

That matters for the beverage sector because wineries are under growing pressure to reduce waste and improve the economics of sustainability efforts. If these extraction methods can be scaled beyond laboratory conditions, they could help producers recover resveratrol, viniferins and related compounds from pruning residues more efficiently. Those extracts could potentially support new uses in wine-adjacent ingredients, functional beverage development or other value-added applications tied to grape production, while also strengthening the case for greener industrial practices.

The authors said the results support NaDES as a green alternative for extracting stilbenoids from vine by-products, with potential applications in cosmetics and functional foods. While the study did not establish commercial performance at industrial scale, it provides new evidence that solvent design can play a major role in improving both yield and sustainability in the use of vineyard leftovers.