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UC Davis Researchers Develop Faster Wine Clarification Method

The new resin-based process could replace bentonite, cutting waste and treatment time for white and rosé wines.

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Researchers at the University of California, Davis say they have developed a faster and more sustainable way to keep white and rosé wines clear, a step that could reduce waste in a process that has changed little in more than a century.

The work, led by Ron Runnebaum, a professor of chemical engineering and viticulture and enology, and Ece Goktayoglu, a doctoral student in chemical engineering, focuses on removing the proteins that can make wine look cloudy after temperature changes during shipping or storage. The haze does not make the wine unsafe to drink, but it can turn off consumers and create problems for producers trying to protect product quality on store shelves and in export markets.

The researchers described their method in a paper published this week in ACS Food Science & Technology. Instead of using bentonite, the clay-based treatment widely used in wineries, they tested a flow-through system packed with a non-swelling ion-exchange resin. In their setup, wine passes through a column containing the resin, which binds to the haze-forming proteins and lets treated wine flow out the other side.

Runnebaum said the goal was to find an alternative that would avoid wine loss and reduce waste. Bentonite treatment can remove up to 10% of the wine because of swelling and settling losses, and it often requires days of waiting followed by extra filtration. The clay is also used once and discarded, which adds to water use and solid waste.

By contrast, the resin can be cleaned and reused. The UC Davis team said the system could shorten treatment time from days to minutes or hours and could eventually fit into a bottling line or be used on only part of a large tank when needed. That flexibility could matter for wineries that do not want to treat an entire batch if only some of it needs stabilization.

The problem is common across the industry. About half of all white and rosé wines worldwide require protein stability treatment, according to the researchers. Wines made from grapes such as chardonnay, sauvignon blanc and pinot grigio are especially vulnerable. When temperatures rise during transport or storage, proteins can unfold and clump together, creating the visible haze that consumers often interpret as a defect.

Goktayoglu said the resin approach has a higher upfront cost than bentonite, but she expects lower costs over time because of reduced labor, less product loss and lower water use. She is now working on a techno-economic analysis to measure those factors

more precisely.

The researchers also said they are trying to determine how much protein must be removed before a wine becomes stable, rather than stripping out all of it. That threshold has not been well defined in industry practice.

For wineries facing pressure to cut waste while keeping wines visually stable from production to pour, the UC Davis work points to a possible replacement for a process that has long been treated as standard.