



The Catena Institute of Wine Publishes Groundbreaking Article in the Most Extensive Terroir Study of Any Varietal Wine

Mendoza, Argentina – February 3, 2021 – The Catena Institute of Wine announces the publication of groundbreaking research, irrefutably proving the existence of terroir and its persistence across vintages. The article, "[Terroir and vintage discrimination of Malbec wines based on phenolic composition across multiple sites in Mendoza, Argentina](#)," appears today in *Scientific Reports*, one of the most-cited journals in the world. The Institute chose to submit the study to *Scientific Reports*, a Nature Research journal, because of its rigorous peer review acceptance process and open access—making it available to everyone.

"Mendoza is one of the few places in the world with strikingly different wine terroirs within short distances," said Dr. Laura Catena, founder of the Catena Institute of Wine. "For the first time, this study shows that the terroir effect can be chemically described from vintage to vintage in larger regions as well as in smaller *parcelas* (parcels). We were able to predict with 100% certainty the vintage of each wine of our study through chemical analysis."

This study is the first to compare four different levels of terroir – three large regions, six departments, 12 geographical indications, and 23 individual *parcelas* (smaller than one hectare) – over three different vintages (2016, 2017 and 2018). Detailed climate data is provided in the study, along with the chemical analysis of 201 wines that were all microvinified under similar conditions. Chemometric data analysis made it possible to group the wines into distinctive regions and *parcelas*.

In addition to predicting the vintage of each wine, 11 out of 23 *parcelas* could be identified by chemical analysis with 100% certainty, while the remaining 12 *parcelas* could be identified with up to 83% certainty. By combining sensory and volatile compound analysis with the chemical analysis in this study, the Institute will be able to add even better reliability to their *parcela* terroir prediction model.

"Our study gives credence to what the Burgundian Cistercian monks called '*cru*,' simply defined by Hugh Johnson as 'a homogeneous section of the vineyard whose wines year after year proved to have an identity of quality and flavor,'" adds Dr. Catena. "And today, for the first time in the scientific literature, the French '*cru*' gets a Spanish name, '*parcela*,' because the wines studied at the Catena Institute of Wine were from Mendoza, Argentina."



International Collaboration – the Authors:

Roy Urvieta^{1,2}, Gregory Jones³, Fernando Buscema², Rubén Bottini^{1,4}, Ariel Fontana^{1,5}

First author Roy Urvieta has been the head of winemaking at the Catena Institute of Wine since 2009. This study is part of his PhD thesis project in agronomy science.

¹ Grupo de Bioquímica Vegetal, Instituto de Biología Agrícola de Mendoza, CONICET- Universidad Nacional de Cuyo, Facultad de Ciencias Agrarias, Mendoza, Argentina – an Argentine research center that aims to improve local farming practices and is affiliated with the Universidad Nacional de Cuyo and CONICET, Argentina’s governmental research branch.

² Catena Institute of Wine, founded by Dr. Laura Catena in 1995. The Catena Institute of Wine (www.catenainstitute.com) aims to elevate Argentine wine and the Malbec variety for the next 100 years.

³ Evenstad Center for Wine Education, Linfield University, McMinnville, Oregon, USA. This Oregon institute is home to Dr. Gregory Jones, one of the world’s leading climatologists. He was a contributing author to the 2008 Nobel Prize-winning Intergovernmental Panel on Climate Change Report. He has received countless awards for his work on climate and viticulture.

⁴ Universidad Juan A. Maza, local University in Mendoza, Argentina.

⁵ Cátedra de Química Orgánica y Biológica, Departamento de Biomatemática y Fisicoquímica, Facultad de Ciencias Agrarias-UNCuyo; the main Public University in Mendoza, Argentina.

Harvest, Vinification and Analysis:

1. The 201 wines from 23 (smaller than 1 Hectare) *parcelas* coming from a total of 12 geographical indications were harvested at the same °Brix (24) for all three vintages: 2016, 2017, 2018.
2. The 201 wines were made under standardized conditions. The microvinifications occurred in 800-liter containers to approximate commercial production and both temperature and extraction were standardized. No oak aging. The samples were kept in 50-liter stainless steel tanks until bottling.
3. In each wine HPLC-DAD (high-performance liquid chromatography) was used to quantify total anthocyanins and low molecular weight components.
4. Using chemometric statistic tools the Institute was able to evaluate whether the data could predict the origin and vintage of each wine.



Background of the Study:

The Catena Institute of Wine began a collaboration with Roger Boulton and Hildegard Heymann at the University of California Davis in 2010 while the Institute's current director, Fernando Buscema, was a graduate student there working at Roger Boulton's lab. Buscema and Boulton's study, published in 2014 and 2015, was the first study to evaluate a single varietal wine, Malbec, across continents through chemometric and sensory analysis. This study involved a single vintage and showed significant terroir effect across continents and among different regions in California, USA and Mendoza, Argentina.

Previous International Terroir Studies:

Previous studies have compared large regions over only one vintage, focusing primarily on chemical analysis of grapes or must rather than wine.

Cabernet Sauvignon from Australia (Robinson et al. 2012), China (Tao, Liu, and Li, 2009), France (Guinard and Cliff, 1987) and United States (Heymann and Noble, 1987).

Chardonnay (Schlosser, Reynolds, King and Cliff, 2005).

Pinot Noir (Grainger C et al. 2021 ; Cantu A et al. 2021 ; Anesi et al. 2015).

The study that most approximates the Institute's was done in Burgundy by Roullier-Gall et al. over three vintages: 2010-2012. This study was much smaller, comparing four *climats* over two Burgundian regions: Côte de Beaune and Côte de Nuits. Concerning the wines, no significant terroir discrimination was found when wines were analyzed immediately after elaboration. In contrast, when the same wines were analyzed after bottle aging, a clear separation between closely related vineyards from the Côte de Beaune and the Côte de Nuits was identified.

In his book *Terroir and other Myths of Winegrowing*, Professor Mark Matthews states that "viticulture could just as well drop terroir and the other myths of winegrowing" and argues throughout that terroir is primarily a human construct and marketing concept. Today, this new study, led by Roy Urvieta, proves through chemical analysis that terroir is no myth.

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About the Catena Institute of Wine

The Catena Institute of Wine was founded in 1995 by Dr. Laura Catena, managing director of Catena Zapata. With the vision to make Argentine wines that stand with the best in the world, the Institute works to advance Argentine wine and its winemaking regions for the next 100 years, and to promote knowledge and understanding through its scientific endeavors with partners around the world. For more information, please visit www.catenainstitute.com.