

BROSSARD, Natalia BSc, MSc, PhD

School of Agriculture and Forestry Sciences, Pontifical Catholic University of Chile

4860 Vicuña Mackenna Avenue, Macul, Santiago 7820436, Chile

Tel: (+56) 223544165 - (+56) 223544159

Email: ndbrossa@uc.cl

Member of the Standards Committee of the Sustainability Code of the Chilean Wine Industry.
R & D Wines of Chile Consortium.

Member of Technical Committee, Consortium R+D Wines of Chile

Member, Association of Enologists Agronomist Engineers of Chile

Member of the Winemakers Accreditation Exam Commission. National Association of Enologist
Agronomists. Chile

Associate Editor. International Journal of Agriculture and Natural Resources

Review Editor in Frontiers in Chemistry - Nanoscience

Member of the International Groupe Polyphenols

I. ACADEMIC BACKGROUND AND PROFESSIONAL EXPERIENCE

Education and qualifications

2013 – 2016 PhD, Agriculture Science, Pontifical Catholic University of Chile

2011 – 2012 MSc, Agriculture Science, Pontifical Catholic University of Chile

2004 – 2008 BSc, Agronomist Engineer, Pontifical Catholic University of Chile

Diploma

2010 National Enologist, Association of Agronomist Engineers Enologists of Chile

2008 Economics, Pontificia Universidad Católica de Chile

Research Internship

2019 Research on tannin characterization by HPLC-DAD, Bologna University, Cesena, Italy (1 month).

2018 Research internship as visiting Professor. International collaboration project between China, Italy and Chile (3 months).

2014 PhD Research in oral tribology of red wines, Zhejiang Gongshang University, China (6 months).

Employment

2016 - Assistant Professor, School of Agriculture and Forestry Sciences, Pontifical Catholic University of Chile

2016 - Professor, Diploma of Chilean Wine: Production, Processing, Marketing and Tasting, School of Agriculture and Forestry Sciences, Pontifical Catholic University of Chile

2009 - 2011 Agronomist of agroindustry and cellar business projects. Consultek Company

Courses: undergraduate level

- Winemaking
- Wine processing
- Principles of Food Processing, Quality and Safety
- Study Trip of Oenology and Viticulture Program

Courses: graduate level

- General Unitary Operations in winemaking

Research interests

- Wine polyphenols: Stability and Sensory Impact,
 - Instrumental Measurements of wine and food mouthfeel,
 - Food Oral Processing
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II. PARTICIPATION IN PROJECTS RESEARCH

- 2020-2022 Project: Incorporation of grape polyphenols on liposomes: from improving food texture to improving health. Grant: CONICYT, Fondecyt Regular 2020, Folio 1200624. Co-researcher. CLP 100k
- 2019-2022 Project: Multi-functional tribometer. Grant: Medium Scientific and Technological Equipment Competition, Fondecyt of Conicyt. Folio EQM190057. External institution. Co-researcher. CLP 120k
- 2019-2020 Project: New fining agent for red wines: Selected proteins to increase sensory quality. Grant: R+D+i Contest for Young Researchers, Copec-UC Foundation. Folio 2018.J.1099. Responsible Researcher. CLP80k
- 2018-2020 Project: Development of a measurement kit for sensory astringency in red wines. Grant: CONICYT, Fund for the Promotion of Scientific and Technological Development of Chile, FONDEF ID18I10246. Responsible Researcher. CL150k
- 2018-2020 Project: New commercial offer for the quinoa on dry farming. Grant: FIC Project Regional Government VI Region. Folio: 40008904-0. Co-researcher. CLP200k
- 2017-2019 Project: Tannin-protein aggregates and oral texture: Study of the effect of grape phenolic maturity on the evolution of wine astringency. Grant: CONICYT, International Cooperation Program, REDI170280. Responsible Researcher. CLP18k
- 2016-2019 Project: Innovation, validation and technology transfer for a rational management of water resources in order to achieve a sustainable and innocuous wine production in the O'Higgins Region. Grant: FIC, Project Regional Government VI Region, 30474717-0. Co-researcher. CLP200k
- 2011-2016 Project: Determination of red wine astringency by rheological and tribological methods. Grant: CONICYT, National PhD scholarship folio 21110184. Responsible Researcher.

III. PUBLICATIONS AND BOOK CHAPTERS

- 2021 Brossard, N., González-Muñoz, B., A. Ricci, F. Osorio, E. Bordeu, G.P. Parpinello, J. Chen. (2021). Astringency sub-qualities of red wines and the influence of wine-saliva aggregates. *International Journal of Food Science & Technology*. DOI: 10.1111/ijfs.15065
- 2021 Garrido-Vargas F., E. Bordeu, J. A. O'Brien, N. Brossard*. (2021). Insights on wine astringency mouthfeel estimations. *Nutrition and Food Science International Journal*. 11(1): 555803. DOI: 10.19080/NFSIJ.2021.11.555803
- 2021 Bonomelli C., S.T. de Freitas, C. Aguilera, C. Palma, R. Garay, M. Dides, N. Brossard and J. A. O'Brien. (2021). Ammonium Excess Leads to Ca Restrictions, Morphological Changes, and Nutritional Imbalances in Tomato Plants, Which Can Be Monitored by the N/Ca Ratio. *Agronomy*. 11(7): 1437. DOI: 10.3390/agronomy11071437

- 2021 Wilhelmy, C., Pavez, C., Bordeu, E. and Brossard, N. (2021). A Review of Tannin Determination Methods Using Spectrophotometric Detection in Red Wines and Their Ability to Predict Astringency. *South African Journal of Enology and Viticulture*, 42(1), pp.1-9. DOI: <https://doi.org/10.21548/42-1-3852>
- 2021 Pavez, C., P. Pszczółkowski, N. Brossard, E. Bordeu. (2021). "Red wines: Carmenère". Bonatto de Castilhos, M; Del Bianchi, V., Manfroi, V. (Ed). *Fermented and distilled beverages: a technological, chemical and sensory overview*. Red wines. 1st ed. Nova Science Publishers, New York, NY, pp 246
- 2020 Brossard, N., Bordeu, E., Ibáñez, R. A., Chen, J., & Osorio, F. (2020). Rheological study of tannin and protein interactions based on model systems. *Journal of Texture Studies*. <https://doi.org/10.1111/jtxs.12518>.
- 2020 Bordeu, E. and Brossard, N. (2020). The sustainability code of the Chilean wine industry. In: Gil, P. and Knopp, D. (eds). *Actions for a sustainable and innocuous viticulture*. Faculty of Agronomy and Forest Engineering, Pontificia Universidad Católica de Chile, 152 pp.
- 2020 Gil, P., Knopp, D., Cea, D., Brossard, N., Zúñiga, A., Bordeu, E. (2020). Innovation for the best use of irrigation water and related supplies. In: Gil, P. and Knopp, D. (eds). *Actions for a sustainable and innocuous viticulture*. Faculty of Agronomy and Forest Engineering, Pontificia Universidad Católica de Chile, 152 pp.
- 2019 Ibáñez, R., Vyhmeister, S., Muñoz, M., Brossard, N., Osorio, F., Salazar, F., . . . Vargas-Bello-Pérez, E. (2019). Influence of milk pH on the chemical, physical and sensory properties of a milk-based alcoholic beverage. *Journal of Dairy Research*, 86(2), 248-251. doi:10.1017/S0022029919000360.
- 2016 Brossard, N., H. Cai, F. Osorio, E. Bordeu, J. Chen. Oral tribological study on the astringency sensation of red wines. *Journal of Texture Studies*. 47(5):392-402
- 2016 Upadhyay, R., Brossard, N. & Chen, J. Mechanisms underlying astringency: introduction to an oral tribology approach. *Journal of Physics D: Applied Physics*. 49(10) p.104003, 2016.

IV. PARTICIPATION IN CONFERENCES AND SEMINARS

- 2020 International Seminar: Advances in Viticulture and Enology, a look from the new and old world of wine. December 16-17, 2020, Webinar Mode. Faculty of Agronomy and Forest Engineering, Pontificia Universidad Católica de Chile. N. Brossard. Characterization of red wines with different astringency sub-qualities through ripening: implications on sensory mechanisms and the role of aggregates.
- 2020 International Conference - Food Engineer Day. Córdoba University, Faculty of Engineering, Department of food engineering. Colombia, October 23, 2020. N. Brossard. Astringency of red wines: An approach from oral tribology.
- 2020 3rd Ibero-American Congress of Food Engineering, Montevideo, Uruguay, November 18-20, 2020. F. N. Salazar, P. Ulloa, N. Brossard, M. Labbé. Adding herbs to craft beer as a substitute for hops.
- 2020 70th Agronomic Congress of Chile. January 7 to 9, 2020. Santiago, Pontificia Universidad Católica de Chile. N. Brossard. Astringency of red wines their relationship with phenolic maturity: Study of Cabernet Sauvignon and Carménère.
- 2019 OENO2019 / IVAS2019. Œno conference: International Symposium of Enology of Bordeaux / IVAS: In Vino Analytica Scientia conference. June 25-28. Bordeaux,

- France. N. Brossard. Red wine astringency: Evolution of tribological parameters during different harvest dates.
- 2019 International Seminar at Viña Almaviva S.A. with Leading Bordeaux Wine Merchants Twins and Joanne US, February 12, 2019, Viña Almaviva, Chile. N. Brossard. Astringency in wine and new technologies for the industry.
- 2018 International Seminar on Advances in Viticulture and Enology in Chile-France-Argentina, December 4 and 5, 2018, Faculty of Agronomy and Forestry Engineering, Pontificia Universidad Católica de Chile. Astringency in wine.
- 2017 4th Agricultural Network Conference. June 13, Casa Piedra, Santiago. N. Brossard. WineTech: Electronic tongue to determine wine roughness.
- 2017 40th World Congress of Vine and Wine, May 29 - June 2. Sofia, Bulgaria. Brossard, N., H. Cai, F. Osorio, E. Bordeu, J. Chen. An approach from oral lubrication and to the role of aggregates in the perception.
- 2017 68th Chilean Agronomic Congress, 15th Congress of the Chilean Fruit Society, October 18 - 20, 2017. Rodríguez, D, González, LM, Cea, D., Brossard, N, Bordeu, E., Bonomelli, C and Gil, PM Physiological behavior and characteristics of wine in a vineyard cv. Cabernet Sauvignon subjected to water deficit and different techniques to mitigate stress due to lack of water.
- 2017 68th Chilean Agronomic Congress, 15th Congress of the Chilean Fruit Society, October 18 - 20, 2017. Rodríguez, D, González, LM, Cea, D., Brossard, N, Bordeu, E., Bonomelli, C and Gil, PM Comparison of water footprint, nutritional content of the grape and quality of wine between two Cabernet Sauvignon barracks, one irrigated by laying and the other by dripping in the town of Santa Cruz, O'Higgins Region.
- 2017 68th Chilean Agronomic Congress, 15th Congress of the Chilean Fruit Society, October 18 - 20, 2017. Rodríguez, D, González, LM, Cea, D., Brossard, N, Bordeu, E., Bonomelli, C and Gil, PM Physiological, productive response and water use efficiency of *Vitis vinifera* cv. Carménère subjected to partial drying of roots in the town of Santa Cruz.
- 2017 68th Chilean Agronomic Congress, 15th Congress of the Chilean Fruit Society, October 18 - 20, 2017. Rodríguez, D, González, LM, Cea, D., Brossard, N, Bordeu, E., Bonomelli, C and Gil, PM Water consumption and wine quality in a Carménère vineyard, subject to water deficit combined with partial drying of roots as a palliative measure.
- 2015 XV Latin American Congress of Viticulture and Oenology. November 3 to 7. Bento Goncalves, Brazil. Brossard, N., H. Cai, F. Osorio, E. Bordeu, J. Chen. Tribological study of oral astringency sensation of red wines
- 2014 37th World Congress of Vine and Wine. November 9 to 14. Mendoza, Argentina. Brossard, N., E. Bordeu, F. Osorio. A physical approximation to sensory astringency.
- 2013 15th Australian Wine Industry Technical Conference 2013. Sydney, Australia. Astringency: A physical approximation.
- 2013 XIV Latin American Congress of Viticulture and Oenology. Determination of Astringency in Red Wines by Rheological Methods. Tarija, Bolivia.
- 2013 XIX National Congress of Food Science and Technology. Antofagasta, Chile. Brossard, N., E. Bordeu, F. Osorio. Reología a potential tool to measure astringency in red wines.
- 2011 XIII Latin American Congress of Viticulture and Oenology. November 21 to 23, 2011. Santiago. Chile. N. Brossard, C. Saavedra, J. A. Alcalde, E. Bordeu, Á.

González, P. Cañón, C. Browne, E. Molina, A. Zúñiga. Effect of vegetative-productive balance in the quality of grapes and wines in cvs Cabernet Sauvignon, Carménère and Pinot noir.

2011 XIII Latin American Congress of Viticulture and Oenology. November 21 to 23, 2011. Santiago. Chile. Natalia Brossard, Camila Saavedra, E. Pape, L. Caiafa, E. Bordeu, J. A. Alcalde. Non-destructive method of leaf area estimation in *Vitis vinifera* L. Cv. Cabernet Sauvignon, Carménère and Pinot noir.

V. ORGANIZATION OF SEMINARS AND CONFERENCES

2021 2nd International Seminar on Advances in Viticulture and Enology, a look from the new and old world of wine. Santiago, January 26 and 27, 2020. Viticulture area. Pontificia Universidad Católica de Chile.

2020 2nd International Seminar on Advances in Viticulture and Enology, a look from the new and old world of wine. Santiago, December 16 and 17, 2020. Enology area. Pontificia Universidad Católica de Chile.

2018-2020 43rd World Congress of Vine and Wine. Santiago, Chile, November 22 to 27, 2020. Organization and Scientific Committee.

2018 Chilean Geological Congress "Geosciences towards the community". Activity: Scientific Committee, Engineering and Environmental Geology, Geosciences and Viticulture sub-area. University of Concepción. November 18 to 23.

2018 International Seminar on Advances in Viticulture and Enology in Chile-France-Argentina, December 4-5, 2018, Faculty of Agronomy and Forestry Engineering, Pontificia Universidad Católica de Chile.

2017 "Enhancing the viticulture of the Cauquenes region in a post-fire scenario", July 21, Cauquenes, Chile.

VI. AWARDS

2019 Copec-UC Foundation Award. Seventh R&D Contest to Innovate for Young researchers. Research Project: New clarifier for red wines.

2010 Best Thesis. ANIAE, National Association of Agronomists Enologists of Chile.