



HAL
open science

How freeing the complexity of process systems in order to modeling global quality of products

Yves Cadot, Cécile Coulon-Leroy, D. Rioux, Brigitte Charnomordic, Cédric Baudrit, S. Guillaume, Nathalie Perrot

► To cite this version:

Yves Cadot, Cécile Coulon-Leroy, D. Rioux, Brigitte Charnomordic, Cédric Baudrit, et al.. How freeing the complexity of process systems in order to modeling global quality of products. 8. International Symposium In vino Analytica Scientia, Jul 2013, Reims, France. 224 p., 2013, Book of Abstracts. 8. International Symposium In vino Analytica Scientia. hal-02746325

HAL Id: hal-02746325

<https://hal.inrae.fr/hal-02746325>

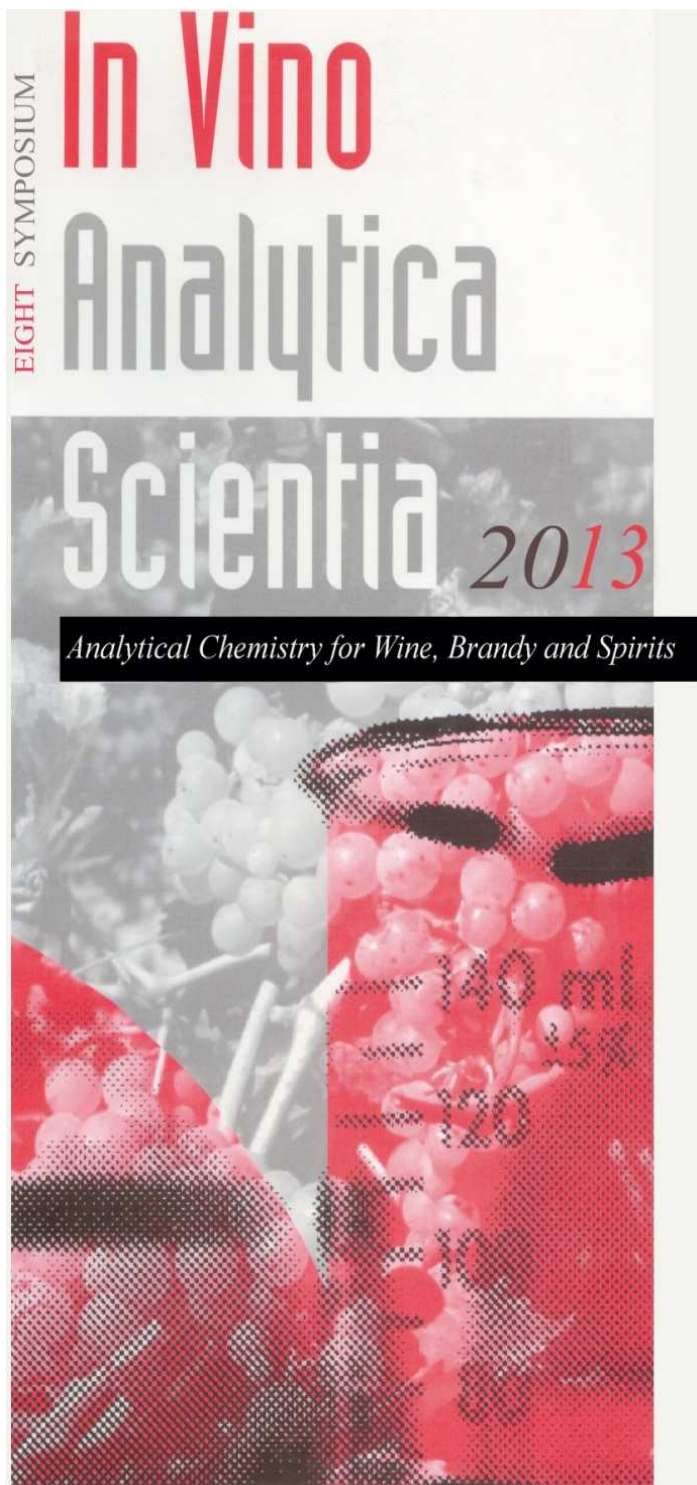
Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



IN VINO ANALYTICA

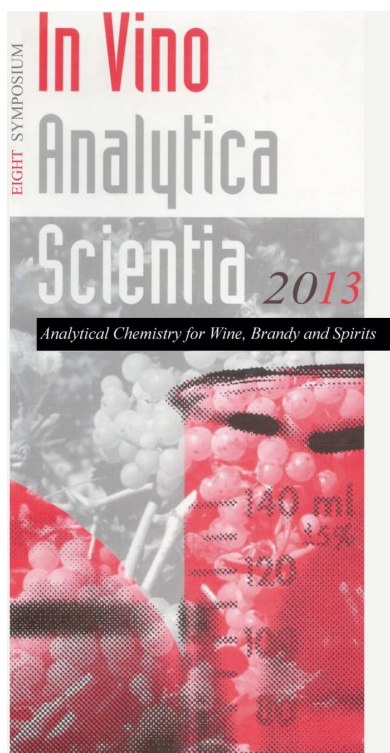
SCIENTIA SYMPOSIUM 2013

University of Reims, Faculty of Sciences

Book of Abstracts

Edited by Philippe JEANDET

**IN VINO ANALYTICA
SCIENTIA SYMPOSIUM 2013**
Reims 2 -5 July

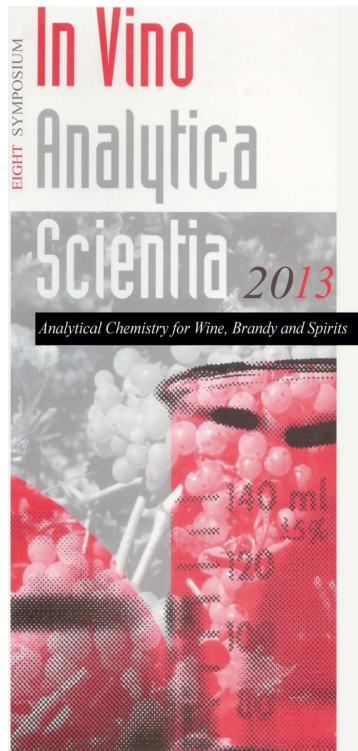


The 8th Edition of *IN VINO ANALYTICA SCIENTIA SYMPOSIUM* will be held at the Faculty of Sciences of Reims 2-5 July 2013.

Aims and Scope of the Meeting

This symposium is a continuation of a successful series of conferences. This international meeting aims to gather researchers, enologists and professionals dedicated to the different aspects of production: from environmental concerns to vines, grapes, and final products, establishing a forum to discuss and present the latest developments of Analytical Chemistry

The Organizers thank the University of Reims and the Faculty of Sciences, the Research Unit “Vines and Wines of Champagne” (UPRES EA 4707), *Reims Métropole*, the *Association Recherche Oenologique Champagne et Université* and the *Institut Oenologique de Champagne* for their support



P82: How Free the Complexity of Process Systems in Order to Modeling Global Quality of Products. Application to Wine Style Prediction.

Cadot Y.^a, Coulon-Leroy C.^b, Rioux D.^c, Charnomordic B.^d, Baudrit C.^e, Guillaume S.^f, Perrot N.^e

^a INRA, UE1117 Vigne et Vin, UMT Vinitera, F-49070 Beaucouzé, France.

^b LUNAM Université, Groupe ESA, UPSP GRAPPE, 55 rue Rabelais, BP30748, 49007 Angers, France

^c CTV, Cartographie des Terroirs Viticoles, UMT Vinitera, F-49070 Beaucouzé, France

^d INRA Supagro, UMR MISTEA, 34060 Montpellier, France

^e INRA, UMR 782 Génie Microbiologique et Alimentaire, AgroParisTech, INRA, 78850 Thiverval-Grignon, France

^f Irstea, UMR ITAP, 34196 Montpellier, France

*yves.cadot@angers.inra.fr

Keywords

Bayesian Network, partial least squares, fuzzy inference systems, typicality

Contribution

Global quality of wines is impacted by a large number of interacting factors including environmental characteristics, cultural and oenological practices. Traditional statistics cannot give accurate results. Scientific works used expert know how or experimentations where processes were fragmented. Now, in order to better understand the process as the whole that could be greater than the sum of its parts, we discuss here new approaches integrating knowledge from experts and automatic learning on data that can be used to model global quality of wines. We focus on three relevant technics: (i) Bayesian network [1] that is a graphical model encoding probabilistic relationships among variables of interest. Bayesian network can be used to learn causal relationships, and can be used to predict the consequences of process ; (ii) PLS path modeling [2] that is a statistical approach for modeling complex multivariable relationships among observed and latent variables, particularly when variables cannot be directly measured and are interconnected ; (iii) fuzzy inference systems [3] that have been proven effective in dealing with complex nonlinear systems containing uncertainties that are otherwise difficult to model. These approaches are applied to a case study, to model styles of red wines in a French vineyard in the middle Loire valley.

REFERENCES

- [1] Baudrit, C., M. Sicard, et al. (2010). "Towards a global modelling of the Camembert-type cheese ripening process by coupling heterogeneous knowledge with dynamic Bayesian networks." *Journal of Food Engineering* **98**(3): 283-293.
- [2] Tenenhaus, M., V. E. Vinzi, et al. (2005). "PLS path modeling." *Computational Statistics & Data Analysis* **48**(1): 159-205.
- [3] Guillaume S, Charnomordic B. Fuzzy inference systems: An integrated modeling environment for collaboration between expert knowledge and data using FisPro. *Expert Systems with Applications*, 2012, **39**(10), 8744-8755.