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SENSORY, CHEMICAL AND CONSUMER STUDY OF THE PEPPERY TYPICALITY OF FRENCH GAMAY N WINES FROM COOL CLIMATE VINEYARDS

In order to study the peppery typicality of Gamay N wines from cool climate vineyard (PDO Côtes d'Auvergne) a study was conducted on 21 Gamay N wines from the 2013 vintage and from 4 French viticultural areas (Auvergne, Beaujolais, Loire Valley, and South West). This research work which contains a sensory, chemical and consumer part was inspired by a study conducted by Lund et al. (1) on Sauvignon Blanc.

MATERIAL AND METHODS

◆ **Wines :** the 21 wines selected for the study were from Auvergne (n = 12), South West (n = 1), Loire Valley (n = 2) and Beaujolais (n = 6). They were selected on the basis of being predominantly from Gamay grapes (>85%) and of not being aged in oak barrels. Their retail price varied from 4.50 to 9.00 euros

◆ **Sensory Analysis :** 8 trained panelists assessed relevant attributes related to aroma and taste on a 5-point rating scale

◆ **Analyses :** conventional enological parameters and rotundone were determined

◆ **Consumer study :** four wines were chosen to participate in two consumer studies in Clermont-Ferrand (n = 47) and Paris (n = 40). The panelists had to proceed an olfactory evaluation by ranking the four wines from 1 "their favourite" to 4 "the less appreciated"

◆ **Statistical treatment :** Statistical analyses including linear regressions were conducted with Xlstat software (Addinsoft, France). Olfactory data were treated through PCA and AHC. AHC was used to select four wines with distinct sensory profiles for the consumer study.
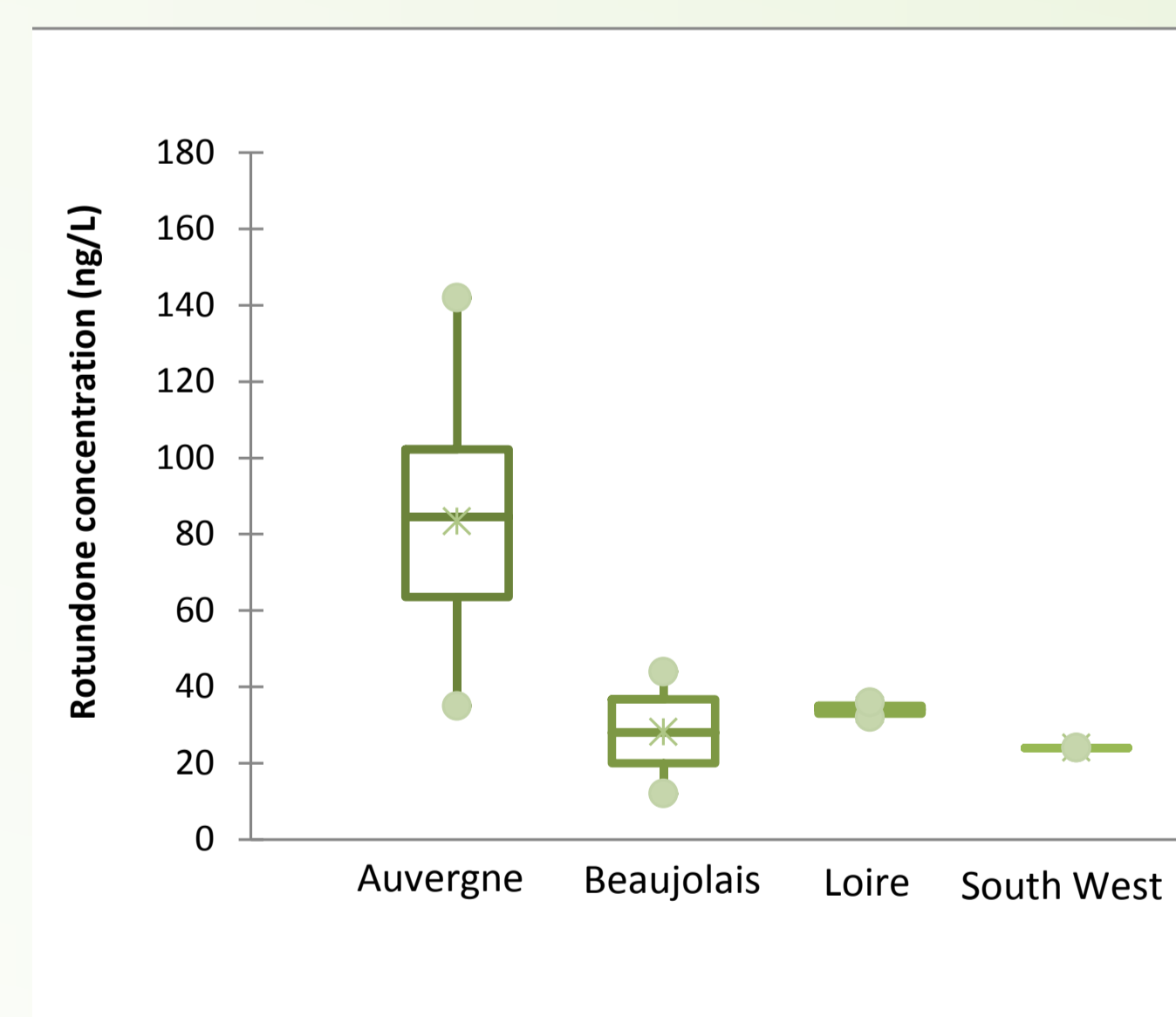
RESULTS AND DISCUSSION
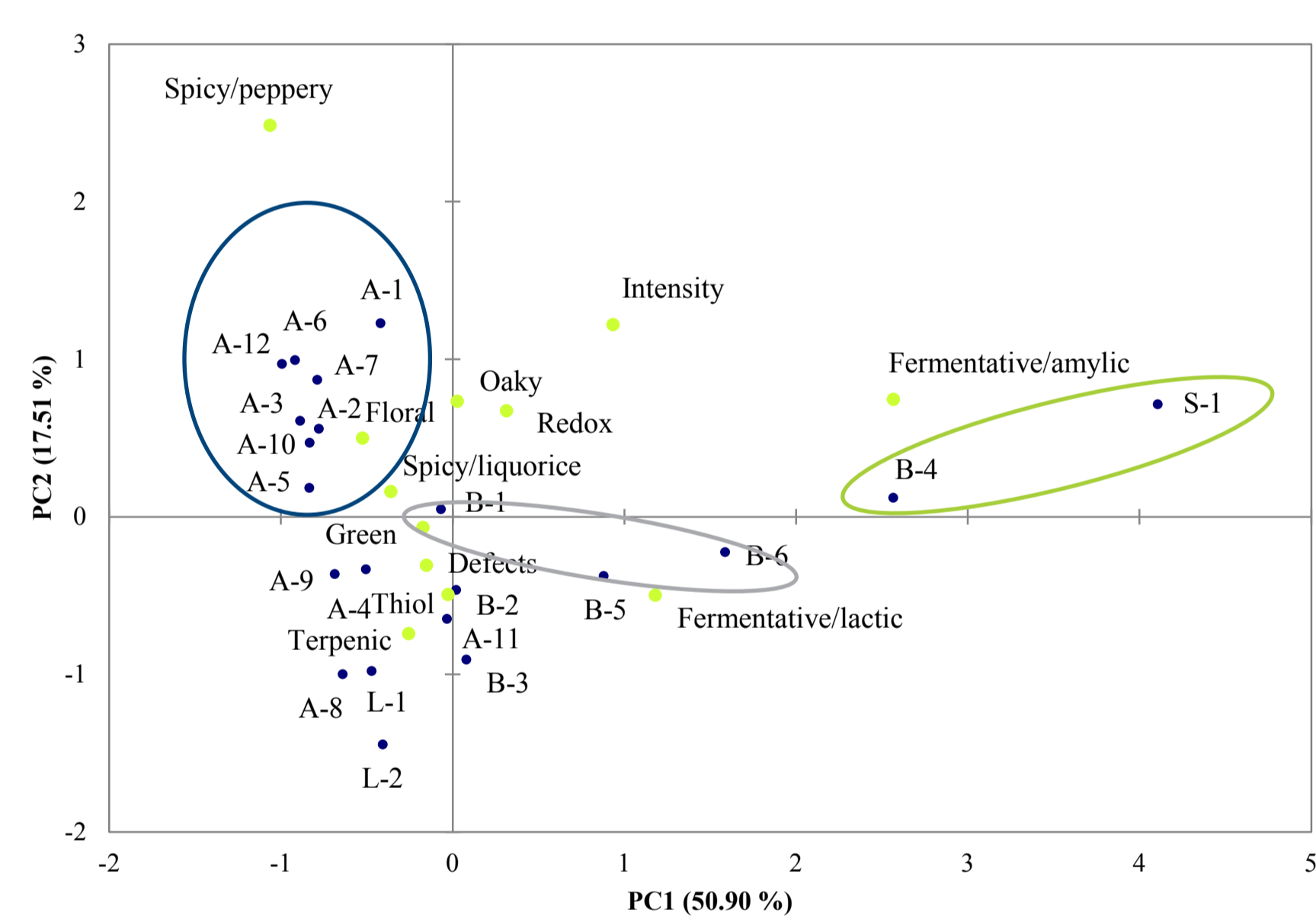
◆ **Sensory analysis**

4 loadings allow explaining the main differences observed between the 21 Gamay N wines of the study: intensity, fermentative/lactic, fermentative/amylic and spicy/peppery. It is possible to constitute a group of wines from Auvergne showing similar sensory characteristics with higher level of peppery notes (A-1, A-2, A-3, A-5, A-6, A-7, A-10 and A-12). While S-1 and B-4 wines are marked by fermentative/amylic notes, B-1, B-5 and B-6 show a fermentative/lactic aroma sensory profile. The other wines of the study have less distinctive aroma profile.

◆ **Rotundone in wines**

Wines from Auvergne show higher rotundone concentrations which is in accordance with the sensory observations. This could reflect a real "terroir" effect or differences in winemaking techniques as all the wines outside of Auvergne contained a proportion of thermovinified wine, a technique *a priori* not favourable to the extraction of the hydrophobic rotundone. A large variability in rotundone concentrations was observed between the wines from Auvergne. When looking at the geographical location of the vineyards where the grapes were sourced, rotundone distribution is not spatially organized which lead to think that the "terroir", especially through its climatic component, is not the dominant factor to explain these differences. Indeed a significant positive correlation (R^2 = 0.43) was established between rotundone and alcohol content of the wines which corroborates previous research works by Geffroy et al. (2). Additionnally, rotundone concentration in wines was well correlated to spicy/peppery notes perceived at tasting (R^2 = 0.66).

◆ **Consumer study**

Panel	Results	Wine / sensory profile			
		S-1 Amylic	B-1 Lactic	A-6 Peppery	A-8 Green
Clermont-Ferrand (n = 47)	Number of times rated as the favourite	22	4	11	10
	Number of times rated as the less appreciated	14	9	17	7
	Sum of the ranks	104	130	129	107
Paris (n = 40)	Number of times rated as the favourite	15	4	10	11
	Number of times rated as the less appreciated	13	10	10	7
	Sum of the ranks	97	105	105	92
Sum of the 2 panels (n = 87)	Number of times rated as the favourite	37	8	21	21
	Number of times rated as the less appreciated	27	19	27	14
	Sum of the ranks	201	235	234	199
	% of consumers that pays more than 5 € when favourite	84	75	90	76
	% of consumers that pays more than 10 € when favourite	38	25	62	43
	Number of times rated as the less appreciated when A-6 (peppery) is preferred	12	5	-	4
	Number of times rated as the less appreciated when S-1 (amylic) is preferred	-	9	19	9

When summing the ranks, wines are close one from the other. The favourite one is the wine with the "green" flavours just ahead of the wine with the "amylic" profile. Even if the S-1 wine has a lot of admirers, it has a lot of detractors. There is also a lack of consensus for the "peppery" wine. However, in terms of citation frequency, the A-6 wine is the second most appreciated especially by consumers who are willing to pay more for a bottle of wine. It is important to notice that there is a strong opposition between the admirers of the "amylic" wine who appear like neophytes, and those of the "peppery" wine, who appear like enlightened wine enthusiasts.

CONCLUSIONS

The results of this study that emphasize the typicality of the Gamay N wines from cool climate vineyards, should help the winegrowers from these regions to promote their wines. It also allows them to appropriate the knowledge on rotundone obtained on other cultivars with the aim to produce wines with a desired level of peppery aroma. The consumer study provides them with key elements to create their wine range.

(1) Lund. C. M.. Thompson. M. K.. Benkwitz. F.. Wohler. M. W.. Triggs. C. M.. Gardner. R.. & Nicolau. L. 2009. New Zealand Sauvignon blanc distinct flavor characteristics: Sensory. chemical. and consumer aspects. American Journal of Enology and Viticulture. 60(1). 1-12.

(2) Geffroy, O., Dufourcq, T., Carcenac, D., Siebert, T., Herderich, M., & Serrano, E. (2014). Effect of ripeness and viticultural techniques on the rotundone concentration in red wine made from *Vitis vinifera* L. cv. Duras. Australian Journal of Grape and Wine Research, 20(3), 401-408.