LETTER TO THE EDITOR

COMMENT ON "FLAVOR AND AROMA ATTRIBUTES OF RIESLING WINES PRODUCED BY FREEZE CONCENTRATION AND MICROWAVE VACUUM DEHYDRATION (CLARY *ET AL*. 2006. J. FOOD PROCESS. PRES. 30, 393–406)"

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In their article, Clary *et al.* (2006) compare the flavor and aroma profiles of "sweet dessert wines produced using late-harvest freeze concentration, wine produced from fresh grapes frozen using refrigeration and wine produced from grapes partially dried using microwave vacuum dehydration." The authors employ sensory panels, as well as solid-phase microextraction (SPME) with gas chromatography-mass spectrometry (GC-MS) analysis, in order to characterize their wines.

The authors make the following statement in their Results and Discussion section: "SPME analysis identified 28 compounds related to the aroma of the wine samples (Table 2). However, the concentrations of these compounds were below the aroma thresholds defined by Guth (1997), Yorgos and Baumes (2000), Zea *et al.* (2001) and Peinado *et al.* (2004). At best, the concentrations detected in the wines were about 20% of the aroma threshold concentration defined in the literature." This statement does not make sense. If all aroma compounds were present at concentrations well below their respective aroma threshold concentrations, how would they be "related to the aroma of the wine samples"? As well, there appear to be only 26 aroma compounds listed in Table 2 of Clary *et al.* (2006), not "28 compounds" as stated in the text.

Furthermore, using the aroma threshold concentrations quoted in Table 2 of Clary *et al.* (2006; which will be discussed later regarding their accuracy, or lack thereof), and the concentrations obtained by SPME/GC-MS as reported by these authors in the same table, the concentrations of the following compounds exceed the quoted aroma thresholds given in Clary *et al.* (2006; treatments exceeding the corresponding aroma threshold are given in parentheses): ethyl acetate (all three treatments); 3-methylbutyl acetate (all three treatments); and ethyl decanoate (frozen by refrigeration and late harvest frozen). Thus, using the authors' own data, their statement that "SPME analysis identified 28 compounds related to the aroma of the wine samples (Table 2). However, the concentrations of these compounds were below the aroma thresholds defined by Guth (1997), Yorgos and Baumes (2000), Zea *et al.* (2001) and Peinado *et al.* (2004). At best, the concentrations detected in the wines were about 20% of the aroma threshold concentration defined in the literature" does not appear internally consistent.

Even more problematic, Clary *et al.* (2006) appear to use incorrect aroma threshold concentrations. In Table 2 of Clary *et al.* (2006), the authors report aroma threshold concentrations in units of mg/L, and also report the concentrations of the aroma compounds identified by SPME/GC-MS in units of mg/L, and then compare the sets of values. Clary *et al.* (2006) cite an article by Guth (1997) as the source of some aroma threshold concentrations. Indeed, Guth (1997) does report aroma threshold concentrations (i.e., odor threshold values) for many of the aroma compounds identified by Clary *et al.* (2006), but Guth (1997) uses the units of μg/L, not mg/L. The following list compares the aroma threshold values by Clary *et al.* (2006), converted from mg/L to ug/L, with the corresponding values as given in Guth (1997):

(**1**) ethyl butanoate: Clary *et al.* (2006), 400 μg/L; Guth (1997), 20 μg/L;

(**2**) 3-methylbutyl acetate: Clary *et al.* (2006), 160 μg/L; Guth (1997), 30 μg/L;

(**3**) 2-methylbutyl acetate: Clary *et al.* (2006), 30,000 μg/L; Guth (1997) does not report an odor threshold for this compound, in contrast to what Clary *et al.* (2006) state. Clary *et al.* (2006) cite Guth (1997) for their value, and have apparently erroneously inserted Guth's (1997) value for 3-methylbutyl acetate (and also failed to convert from μg/L to mg/L) as a value for 2-methylbutyl acetate;

(**4**) ethyl hexanoate: Clary *et al.* (2006), 25,000 μg/L; Guth (1997), 5 μg/L;

(**5**) ethyl octanoate: Clary *et al.* (2006), 5,000 μg/L; Guth (1997), 2 μg/L;

(**6**) 2-phenylethyl acetate: Clary *et al.* (2006), 1,800 μg/L; Guth (1997), 250 μg/L;

(**7**) 2-methyl-1-propanol: Clary *et al.* (2006), 625,000 μg/L; Guth (1997), 40,000 μg/L;

(**8**) 3-methyl-1-butanol: Clary *et al.* (2006), 625,000 μg/L; Guth (1997), 30,000 μg/L;

(**9**) linalool: Clary *et al.* (2006), 5,000 μg/L; Guth (1997), 15 μg/L;

(**10**) β-damascenone: Clary *et al.* (2006), 625,000 μg/L; Guth (1997), 0.05 μg/L; and

(**11**) acetaldehyde: Clary *et al.* (2006), 100,000 μg/L; Guth (1997), 500 μg/L.

As well, the aroma threshold of 1-propanol is reported to range between 8,000 and 81,000 μg/L (Moshonas and Shaw 1994), which is far lower than the single value of 306,000 μg/L quoted in Clary *et al.* (2006).

Clary *et al.* (2006) also quote purported "aroma threshold" concentrations for ethyl hexanoate, ethyl octanoate, 2-methyl-1-propanol, 3-methyl-1-butanol, 1-hexanol, linalool, ß-damascenone and hexanoic acid from Kotseridis and Baumes (2000), when in fact, Kotseridis and Baumes (2000) report flavor dilution factors for these compounds, not aroma thresholds.

Clary *et al.* (2006) originally claimed the following compounds were present in one or more of their treatments at concentrations below the corresponding aroma threshold, when it appears the compound is present above the aroma threshold in at least one of the treatments: ethyl butanoate, 2-methylbutyl acetate (assuming the aroma threshold for this compound is approximately equivalent to that of 3-methylbutyl acetate), ethyl hexanoate, ethyl octanoate, linalool, β-damascenone and potentially 1-propanol.

In light of these issues, the findings reported by Clary *et al.* (2006) appear to be seriously flawed.

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