Correlation between Volatile Aroma Compounds and Sensory Attributes of Minimally Processed Herbs

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Abstract

Consumers choose herbs by their characteristic flavour although they perceive only a fraction of their volatiles aroma compounds. Few studies have focused on comparing aroma determined in sensory analysis and volatiles identified in instrumental analysis. This study aims to assess consumers' preference by identifying the correlation between the two parameters. Pearson coefficient was applied on the aroma scores and the content of volatile aroma compounds previously determined for parsley (*Petroselinum crispum*), dill (*Anethum graveolens*), and lovage (*Levisticum officinale*). We found that assessors preferred parsley rich in β -phellandrene but low in 1.3.8-p-menthatriene and d-limonene. They liked β -phellandrene in dill but disliked α -phellandrene. Consumers favoured α -phellandrene in lovage alongside α -terpinolene, and d-limonene but disfavoured β -myrcene.

Our findings confirmed a significant correlations between sensory aroma and the content of volatile aroma compounds.

Keywords: *aroma, dill, lovage, odour, parsley, taste*

Introduction. Consumers prefer herbs with strong characteristic flavours although humans detect only a fraction of the plant volatiles (Goff and Klee, 2006). Several studies identified the volatile compounds of herbs (Lechtenberg *et al.*, 2007; Masanetz and Grosch, 1998; Vokk *et al.*, 2011); others determined their sensory profile (Hoberg *et al.*, 2007; Rosa *et al.*, 2007) but few considered the relation between the two (Ulrich *et al.*, 2011). We aimed to explain consumers' preference by evaluating the correlation between the content of volatile aroma compounds and sensory attributes.

Materials and methods. The sensory attributes and volatile aroma compounds were previously determined for parsley (*Petroselinum crispum*), dill (*Anethum graveolens*), and lovage (*Levisticum officinale*) (Cătunescu *et al.* 2012, 2014). Pearson coefficient was used to identify and quantify correlations with a confidence level of 95%.

Results and Discussion. 1.3.8-p-menthatriene, β -phellandrene, β -myrcene, and d-limonene characterised parsley. Assessors preferred parsley samples with a low β -phellandrene content ($r_{(taste)} = -0.98$; $r_{(odour)} = -0.90$; $r_{(aroma)} = -0.94$; $p < 0.05$), but rich in 1.3.8-p-menthatriene ($r_{(taste)} = 0.68$; $r_{(aroma)} = 0.56$; $p < 0.05$) and d-limonene ($r_{(taste)} = 0.69$; $r_{(odour)} = 0.56$; $r_{(aroma)} = 0.61$; $p < 0.05$). 1.3.8-p-menthatriene and β -phellandrene accounted for more than 20% of the volatile compounds (Cătunescu *et al.* 2014) conferring parsley its specific aroma as previously reported (Charles, 2012; Masanetz and Grosch, 1998).

Dill contained mainly β -phellandrene: more than 75% of the volatile compounds (Cătunescu *et al.* 2014). Evaluators preferred dill containing high amounts of β -phellandrene ($r_{(taste)} = 0.83$; $r_{(odour)} = 0.89$; $r_{(aroma)} = 0.88$; $p < 0.05$), but low amounts of α -phellandrene ($r_{(taste)} = -0.79$; $r_{(odour)} = -0.88$; $r_{(aroma)} = -0.86$; $p < 0.05$).

Lovage contained β -phellandrene, α -terpinolene, β -myrcene, d-limonene, and α -phellandrene, which accounted for more than 83% of the volatile compounds (Cătunescu *et al.* 2014). Aroma scores correlated positively with α -terpinolene ($r_{(taste)} = 0.62$; $r_{(odour)} = 0.75$; $r_{(aroma)} = 0.72$; $p < 0.05$), d-limonene ($r_{(taste)} = 0.81$; $r_{(odour)} = 0.92$; $r_{(aroma)} = 0.90$; $p < 0.05$), and α -phellandrene ($r_{(taste)} = 0.86$; $r_{(odour)} = 0.72$; $r_{(aroma)} = 0.80$; $p < 0.05$). β -myrcene correlated strongly negatively with aroma scores ($r_{(taste)} = -0.81$; $r_{(odour)} = -0.93$; $r_{(aroma)} = -0.91$; $p < 0.05$). So, consumers prefer lovage rich in α -terpinolene, d-limonene, and α -phellandrene but low on β -myrcene.

Conclusion. We found significant correlations between sensory aroma and the content of volatile aroma compounds. These encouraging results reinforce the importance of sensory perception in determining food quality after processing and during storage.

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