Efficient screening of odorants’ taste dimensions by gas chromatography olfactometry associated taste (GC-OAT) and olfactoscan

Carmen Barba, Elisabeth Guichard, Eliane Lagrange, Noëlle Béno, Thierry Thomas-Danguin

To cite this version:
Carmen Barba, Elisabeth Guichard, Eliane Lagrange, Noëlle Béno, Thierry Thomas-Danguin. Efficient screening of odorants’ taste dimensions by gas chromatography olfactometry associated taste (GC-OAT) and olfactoscan. 11. Wartburg symposium on flavor chemistry & biology, Jun 2016, Eisenach, Germany. 1 p., 2016. hal-02795109

HAL Id: hal-02795109
https://hal.inrae.fr/hal-02795109
Submitted on 5 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.
Efficient screening of odorants’ taste dimensions by gas chromatography olfactometry associated taste (GC-OAT) and olfactoscan

Carmen Barba,1,2,3, Elisabeth Guichard1,2,3, Eliane Lagrange1,2,3, Noelle Ben®2,3, and Thierry Thomas-Danguin

1 INRA, UMR1324 Centre des Sciences du Goût et de l’Alimentation, F-21000 Dijon, France, 2 CNRS, UMR6265 Centre des Sciences du Goût et de l’Alimentation, F-21000 Dijon, France, 3 Université de Bourgogne-Franche-Comté, UMR Centre des Sciences du Goût et de l’Alimentation, F-21000 Dijon, France

Introduction

- Many odors are described with taste attributes [1] although these volatile molecules are not able to activate taste receptors.
- Odor-induced taste is the result of a cognitive process, which depends on individuals’ experience and associative memory.
- Those odorants congruent with taste may increase sweet [2] or salty taste perception [3] in foods with respectively less sugar or salt added that is an interesting option for healthier food products formulation.

Materials and methods

Gas Chromatography Olfactometry Associated to Taste (GC-OAT)

- SAFE extract
- 1µL DB-Wax (30m x 0.32mm x 0.5µm)
- 12 trained judges
- Detection Frequency (DF)

Test 1: Odor descriptors

![Chromatogram of multi-fruit juice for test 1](image1)

Test 2: Odor associated to taste

![Chromatogram of multi-fruit juice for test 2](image2)

Olfactoscan (Olfactometer Coupled to GC-O)

- SAFE extract
- 1µL DB-Wax (30m x 0.32mm x 0.5µm)
- 12 trained judges
- Sweet intensity rating

To rate sweetness by orthonasal olfaction

![Olfactoscan](image3)

Odorants Associated to Taste in a Juice Extract

![Aromagram sweet association](image4)

Table 1: Identification of odor associated to sweetness compounds

<table>
<thead>
<tr>
<th>No</th>
<th>NF (%)</th>
<th>DF (%)</th>
<th>CHEMICAL NAME</th>
<th>ODOR ATTRIBUTES (TEST 1)</th>
<th>TASTE ATTRIBUTES (TEST 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>83</td>
<td>67</td>
<td>n.d.</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>2</td>
<td>92</td>
<td>75</td>
<td>methyl-2-methylbutanoate</td>
<td>fruity, fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>75</td>
<td>ethyl-2-methylbutanoate</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>75</td>
<td>3-ethylcyclohexanol</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>5</td>
<td>92</td>
<td>75</td>
<td>n.d.</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>6</td>
<td>75</td>
<td>50</td>
<td>pyrazine</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>7</td>
<td>67</td>
<td>67</td>
<td>2-phenylethanol</td>
<td>fruity</td>
<td>sweet +</td>
</tr>
<tr>
<td>8</td>
<td>54</td>
<td>44</td>
<td>5-ethyl-2-methyl-3-phenyl-2-butanone</td>
<td>fruity, salty, sweet</td>
<td>sweet + +</td>
</tr>
<tr>
<td>9</td>
<td>50</td>
<td>50</td>
<td>n.d.</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>10</td>
<td>75</td>
<td>67</td>
<td>anisole</td>
<td>fruity, sweet</td>
<td>sweet +</td>
</tr>
<tr>
<td>11</td>
<td>75</td>
<td>50</td>
<td>2-phenylethanol</td>
<td>fruity</td>
<td>sweet +</td>
</tr>
</tbody>
</table>

Conclusions

- GC-OAT analysis is an original and efficient approach for the selection of odor-inducing taste compounds that may be used to modulate taste perception in food.
- Four odors were found to increase odor sweet perception of multi-fruit juice (p<0.01). The sweetness enhancement in juice by odor is in the range of 20% to 70%.

Acknowledgements

Carmen Barba has received the support of the EU in the framework of the Marie Skłodowska-Curie H2020-MSCA-IF-2014-655545. We would like to thank Eckes Granini France for providing juice samples and Karine Gourrat from ChemoSens Platform for the technical support.

Bibliography