Title: AROMA COMPOSITION INCLUDING 2,4- NONADIENE

Abstract: A method of enhancing the aroma of an aroma composition, comprising the addition to the composition of an aroma-enhancing quantity of 2,4-nonadiene. The addition enhances the "radiance" of aroma compositions, especially foodstuffs, resulting in a stronger aroma and the need for reduced quantities of additional aroma ingredients.
This disclosure relates to aroma enhancement of compositions in which aroma is an important factor.

A desirable aroma is a feature of many compositions. Such compositions include not only those to which perfume is normally added, such as cleaning compositions (soaps, washing detergents and other cleaning compositions, fabric softeners) and cosmetics, but also in edible compositions such as foodstuffs and beverages, in which the taste is actually at least partially caused by the aroma of the foodstuff or beverage. This is inhaled through the nose when the foodstuff or beverage is in the proximity of the consumer and the sensations triggered by the receipt of aroma molecules by the receptors in the nose complement those of the receptors on the tongue as the edible composition is tasted. All of these compositions shall hereinafter be referred to as "aroma compositions".

It has been observed that the addition of certain substances to aroma compositions enhances the perception of the aroma and thus causes a greater pleasurable sensation than would be the case for the same aroma composition without the substances. This is sometimes referred to as "enhanced radiance".

It has now been found that the addition of 2,4-nonadiene gives such an effect. There is therefore provided a method of enhancing the aroma of an aroma composition, comprising the addition to the composition of an aroma-enhancing quantity of 2,4-nonadiene.

There is additionally provided an aroma-providing composition, comprising at least one aroma ingredient and 2,4-nonadiene.

There is further provided an aroma composition comprising an aroma-enhancing proportion of 2,4-nonadiene.

2,4-nonadiene is a compound of the formula:
It occurs in nature and is currently used in the creation and manufacture of flavour concentrates. However, it is not considered to be a flavourant in its own right, so it is surprising that it has any effect at all, never mind the considerable aroma-enhancing properties that are the subject of this disclosure. A further surprising effect is that the addition of 2,4-nonadiene will enhance the aroma of a wide variety of compositions, invoking a much stronger aroma sensation in a consumer. A much smaller proportion of the aroma material will be needed to produce the same effect.

The proportion of 2,4-nonadiene required will depend on the aroma composition concerned and the nature and extent of the effect required, and the skilled perfumer or flavourist will readily be able to deduce a suitable proportion for every use. However, as a rough guide, the proportion may be between 1ppb and 10ppm, particularly between 100ppb and 1ppm.

2,4-nonadiene may be added directly to an aroma composition, or it may form part of an aroma-producing composition, that is, a composition whose function is solely to provide aroma. Such a composition comprises typically at least one aroma ingredient and 2,4-nonadiene. The additives and ancillary materials normally found in such compositions, such as solvents, thickeners, surfactants and the like, may also be included in art-recognised proportions.

The range of aroma compositions in which 2,4-nonadiene may be used is very wide.

Non-limiting examples in the fragrance field include any use in which the presence of fragrant substances is required. These range from fine fragrances for personal use to fragrances added to commercial, cosmetic, personal and household products, such as creams and lotions, soaps and shampoos, detergent powders, fabric softeners, surface cleaners and the like.

Non-limiting examples in the flavours field include a wide variety of consumable products. By "consumable products" is meant any product that is taken by mouth, for spitting out
(such as toothpaste or mouthwash) or ingestion (such as foodstuffs and beverages). Non-limiting examples include the following:

Food products, food additives, nutraceuticals, pharmaceuticals and any product placed in the mouth including chewing gum, oral care products, and oral hygiene products including but not limited to, cereal products, rice products, tapioca products, sago products, baker's products, biscuit products, pastry products, bread products, wafers, confectionery products, dessert products, gums, chewing gums, flavored or flavor-coated straws, flavor or flavor-coated food/beverage containers, chocolates, ices, honey products, treacle products, yeast products, baking-powder, salt and spice products, savoury products, soups, mustard products, vinegar products, sauces (condiments), tobacco products, cigars, cigarettes, processed foods, cooked fruits and vegetable products, meat and meat products, jellies, jams, fruit sauces, egg products, milk and dairy products, yoghurts, cheese products, butter and butter substitute products, milk substitute products, soy products, edible oils and fat products, medicaments, beverages, carbonated beverages, alcoholic drinks such as beers, wines and spirits, non-alcoholic drinks such as soft drinks, mineral and aerated waters, fruit drinks, fruit juices, coffee, artificial coffee, tea, cocoa, including forms requiring reconstitution including, without limitation, beverage powder, milk based beverage powder, sugar-free beverage powder, beverage syrup, beverage concentrate, instant coffee, instant tea, instant cocoa, and coffee whitener, food extracts, plant extracts, meat extracts, condiments, gelatins, pharmaceutical and non-pharmaceutical gums, tablets, lozenges, drops, emulsions, elixirs, syrups and other preparations for making beverages, and combinations thereof.

Oral care products, including, but not limited to, any composition applied to the oral cavity for the purposes of cleaning, freshening, healing, deodorising the cavity or any part thereof, may include, but are not limited to, toothpastes, tooth gels, tooth powders, tooth whitening products, mouthwashes, lozenges, dental floss, toothpicks, anti-plaque and anti-gingivitis compositions, throat lozenges, throat drops, inflammatory compositions, compositions for treatment of nasal symptoms, cold symptoms and upper gastrointestinal tract distress, compositions for cold relief, for alleviating discomfort of hot flash, and gargle compositions.
The disclosure is further described with reference to the following worked examples, which depict particular embodiments and which are not intended to be in any way limiting.

A chicken flavour was prepared according to the following formula.

<table>
<thead>
<tr>
<th>Decadienal-2,4</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl-2 Mercapto-3 Tetrahydrofuran</td>
<td>0.5</td>
</tr>
<tr>
<td>Methyl-2 Furanthiol-3</td>
<td>0.6</td>
</tr>
<tr>
<td>Furfuryl Mercaptan</td>
<td>0.02</td>
</tr>
<tr>
<td>Methional</td>
<td>0.6</td>
</tr>
<tr>
<td>Trimethyl-2,3,5 Pyrazine</td>
<td>5</td>
</tr>
<tr>
<td>Hexanal</td>
<td>0.1</td>
</tr>
<tr>
<td>Sulforol</td>
<td>20</td>
</tr>
<tr>
<td>Methyl-2 keto-3 Tetrahydrothiophene</td>
<td>0.3</td>
</tr>
<tr>
<td>Ethanol</td>
<td>968.88</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1000</td>
</tr>
</tbody>
</table>

The chicken flavour sample was taken and used as a control (hereinafter referred to as Sample 1). To a further sample, nonadiene 2,3-al, trans/trans was added at a rate of 0.001% by weight replacing an equivalent amount of ethanol. Thus latter sample was referred to as Sample 2.

The samples were placed in separate aroma booths, that is, climate controlled cabins of approximately 2 m³, equipped with a window, adapted to be briefly opened for the purposes of evaluation.

A blind pair comparison test was conducted on the aroma strength. The pair comparison was preceded by a warm-up test where the panellist was invited to smell a room in which the sample 1 was placed.

In order to reach room aroma filling equilibrium, samples were left exactly 15 minutes before the evaluation. For each panellist, the time was precisely the same. In order to
maximise precision, panellists were unable to retest. This avoided aroma loss in the rooms during the completion of the test.

The pair comparison was completed as follows: Sample 1 vs. Sample 2, n = 41 semi-naïve evaluators (non sensory-trained evaluators but used to taste and smell flavours). Over the 41 panellists, 7 considered sample 1 as stronger while 34 considered sample 2 as stronger in aroma.

Significance of the differences between the two samples/rooms was calculated using binomial statistical tests. Results show also that in the room containing the sample 2, the overall aroma intensity is significantly higher (p<0.001) than in the room containing sample 1 (identical flavour without the aroma enhancing compound).

The conclusion is that the aroma-enhancing compound including added to a chicken flavour increases significantly the overall aroma intensity perceived in a room containing that chicken flavour. Therefore the component significantly increases the "radiance" of the chicken flavour.
Claims:

1. A method of enhancing the aroma of an aroma composition, comprising the addition to the composition of an aroma-enhancing quantity of 2,4-nonadiene.

2. A method according to claim 1, in which the 2,4-nonadiene is present in the composition in a concentration of from 1ppb to 10ppm, particularly between 100ppb and 1ppm.

3. A method according to claim 1, in which the aroma composition is a composition comprising fragrant materials.

4. A method according to claim 1, in which the aroma composition is a consumable composition.

5. An aroma-providing composition, comprising at least one aroma ingredient and an aroma-enhancing quantity of 2,4-nonadiene.

6. An aroma composition, comprising an aroma-enhancing quantity of 2,4-nonadiene.
A. CLASSIFICATION OF SUBJECT MATTER
INV. A23L1/226
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23L Cl1B C07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, FSTA, WPI Data, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>JP 2002 180080 A (NISSHIN SEI FUN GROUP INC) 26 June 2002 (2002-06-26) abstract page 5, right-hand column, line 29 -----</td>
<td>1-6</td>
</tr>
<tr>
<td>X</td>
<td>UMAN0 K ET AL: &quot;Analysis of headspace volatiles from overheated beef fat &quot;, JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, vol. 35, no. 1, 1987, pages 14-18, XP002659151, DEP. OF ENVIRONMENTAL TOXICOLOGY, UNIV. OF CALIFORNIA, USA DOI: 10.1021/JF00073A004 abstract; table 1 -----</td>
<td>5,6</td>
</tr>
</tbody>
</table>

X Further documents are listed in the continuation of Box C. X See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered to involve a inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is taken alone with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search 15 September 2011
Date of mailing of the international search report 29/11/2011

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HJ Rijswijk
Tel. (+31-70) 340-2040, Fax. (+31-70) 340-3016

Authorized officer
Rinaldi, Francesco
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>JP 2002 180080 A</td>
<td>26-06-2002</td>
<td>NON E</td>
</tr>
</tbody>
</table>

Form PCT/ISA/210 (patent family annex) (April 2005)