

Study on furanic acids found in coffee brew

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Introduction

Coffee is one of the most widely consumed beverages worldwide. Numerous studies have investigated its aroma and identified ~850 volatile components^[1]. These findings have been valuable for formulating coffee flavors; however, reproducing the complex aroma of coffee using only known odorants remains challenging. This indicates unidentified odorants that contribute to the characteristic aroma of coffee brews. To reproduce the original flavor of coffee with high quality, identifying these unknown aroma components is essential.

Objectives: To identify unknown key odorants in coffee brew and evaluate their effect on flavor.

Materials/Methods

Preparation of a volatile aroma concentrate



SAFE: Solvent-Assisted Flavor Evaporation^[2]

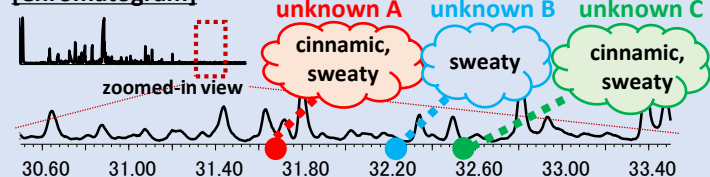
Gas chromatography–mass spectrometry/olfactometry (GC-MS/O) was used to identify key odorants in the aroma concentrate.

Results/Discussion

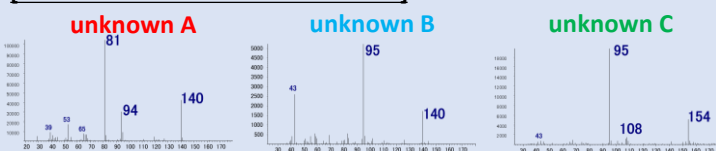
Results of the GC-MS/O analysis of the aroma concentrate

- Three previously unidentified odorants with cinnamic and/or sweaty odor characteristics were detected.
- Their mass spectra (MS) were obtained.

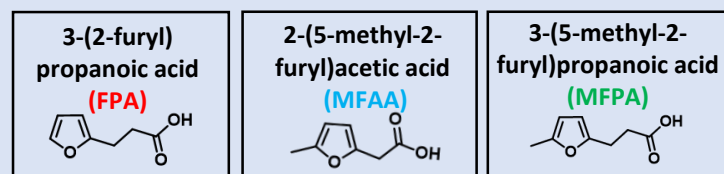
[Chromatogram]



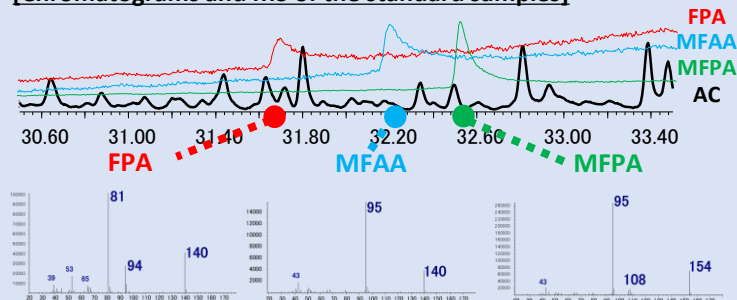
[MS data of the unknown odorants]



Based on the MS data, the following chemical structures were obtained and standard samples were analyzed under identical conditions.



[Chromatograms and MS of the standard samples]



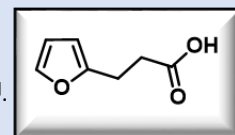
The retention times, MS, and odor qualities matched well.

The unknown odorants were identified as **FPA**, **MFAA**, and **MFPA**.

3-(2-Furyl)propanoic acid (FPA)

Identified previously in acerola (*Malpighia puniceifolia*)^[3] and walnut (*Juglans mandshurica*)^[4].

Had the strongest odor among the three unknowns by GC-MS/O and is focused in this poster.



CAS No. 935-13-7
FEMA No.5037

[Our findings]

- The **FPA** detection in coffee brew is novel.
- odor description: sweaty and cinnamic
- odor threshold: 1.55 µg/kg (in water)

Sensory evaluations

Sensory evaluations were conducted in a descriptive analysis to elucidate the **FPA** additive effect on two types of coffee drinks.

[Unsweetened black coffee]

■ control A (unsweetened black coffee)

■ control A + **FPA** 5ppb

■ control A + **FPA** 50ppb

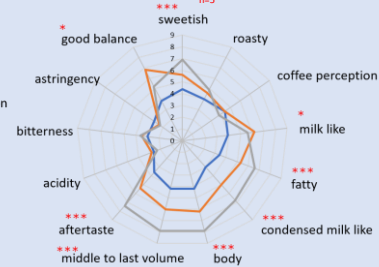


[Sweetened milk coffee]

■ control B (sweetened milk coffee)

■ control B + **FPA** 5ppb

■ control B + **FPA** 50ppb



- FPA contributed to several characteristic sensory attributes in both coffee drinks.
- A concentration of 5 ppb **FPA** achieved better balance than 50 ppb in both coffee drinks.

Conclusion/Perspectives

- The unknown components were identified as **3-(2-furyl)propanoic acid**, **2-(5-methyl-2-furyl)acetic acid**, and **3-(5-methyl-2-furyl)propanoic acid**.
- Sensory evaluation showed that **FPA** contributed to the characteristic attributes of unsweetened black coffee and sweetened milk coffee.
- **FPA** provides a basis for developing novel coffee flavors that enhance the quality of coffee products.
- In the future, evaluations of **MFAA** and **MFPA** in coffee drinks will be conducted.

References:

- [1] Flament I (2002) Coffee Flavor Chemistry. John Wiley & Sons Ltd, Chichester, pp. 74–75.
- [2] Semmelroch P, Grosch W (1996) J Agric Food Chem 41:537–543.
- [3] Tremonte P, Sorrentino E, Succi M, Tipaldi L, Pannella G, Ibañez E, Mendiola JA, Renzo TD, Reale A, Coppola R (2016) J Food Sci 81:97–105.
- [4] Li JF, Shi B, Du RJ, Shu Z, Hou XH (2013) Chin J Exp Tradit Med Formulae :62–65.