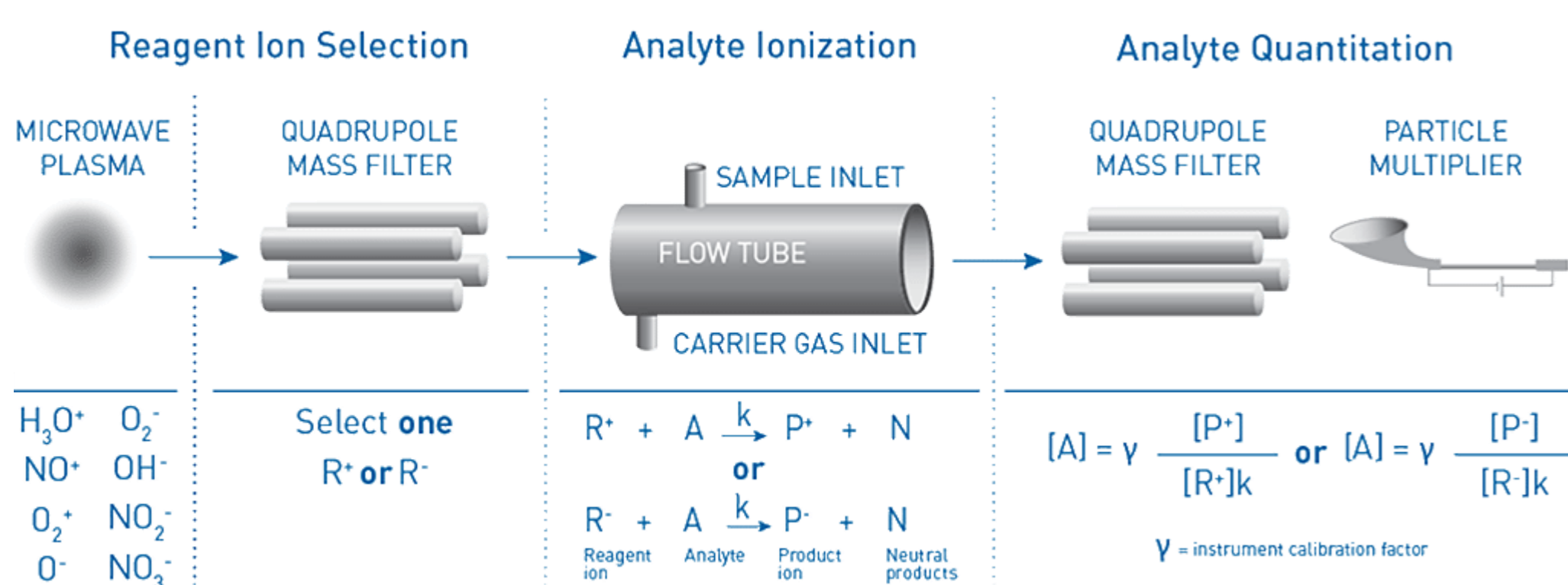


Rapid and direct analysis of coffee beans (green and roasted) and online monitoring of coffee roasting by SIFT-MS: focus on volatile aldehydes

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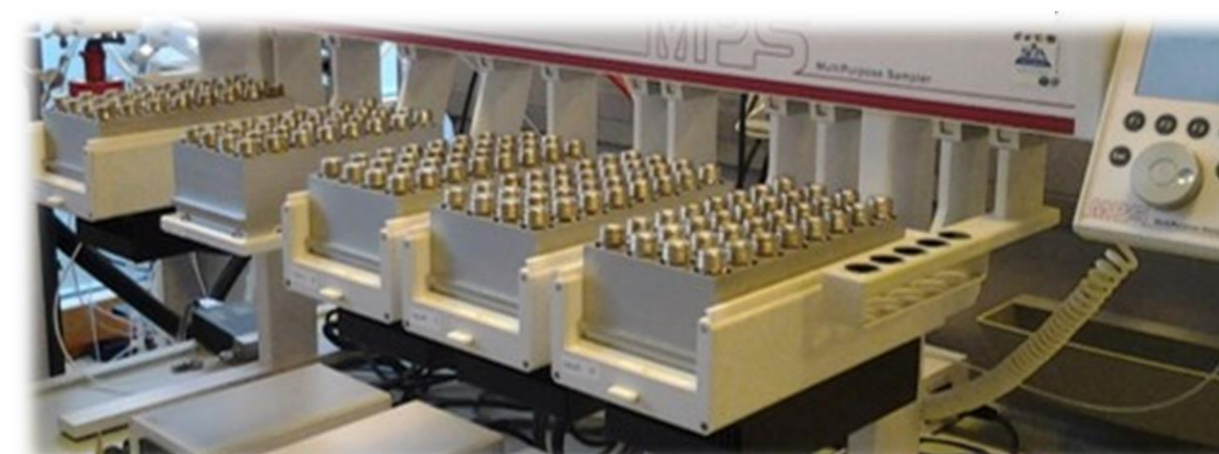
Aroma of coffee beans (*Coffea arabica*) contributes to its quality evaluation and its origin tracing. The part of coffee aroma such as volatile aldehydes is linked directly to volatile organic compounds (VOCs) naturally occurring in green coffee beans as well as to roasting process. Fast and direct volatile aldehydes detection in green beans, during coffee roasting, and in roasted beans by a selected ion flow tube mass spectrometer (SIFT-MS) may possibly be a way for characterization of coffee origins.



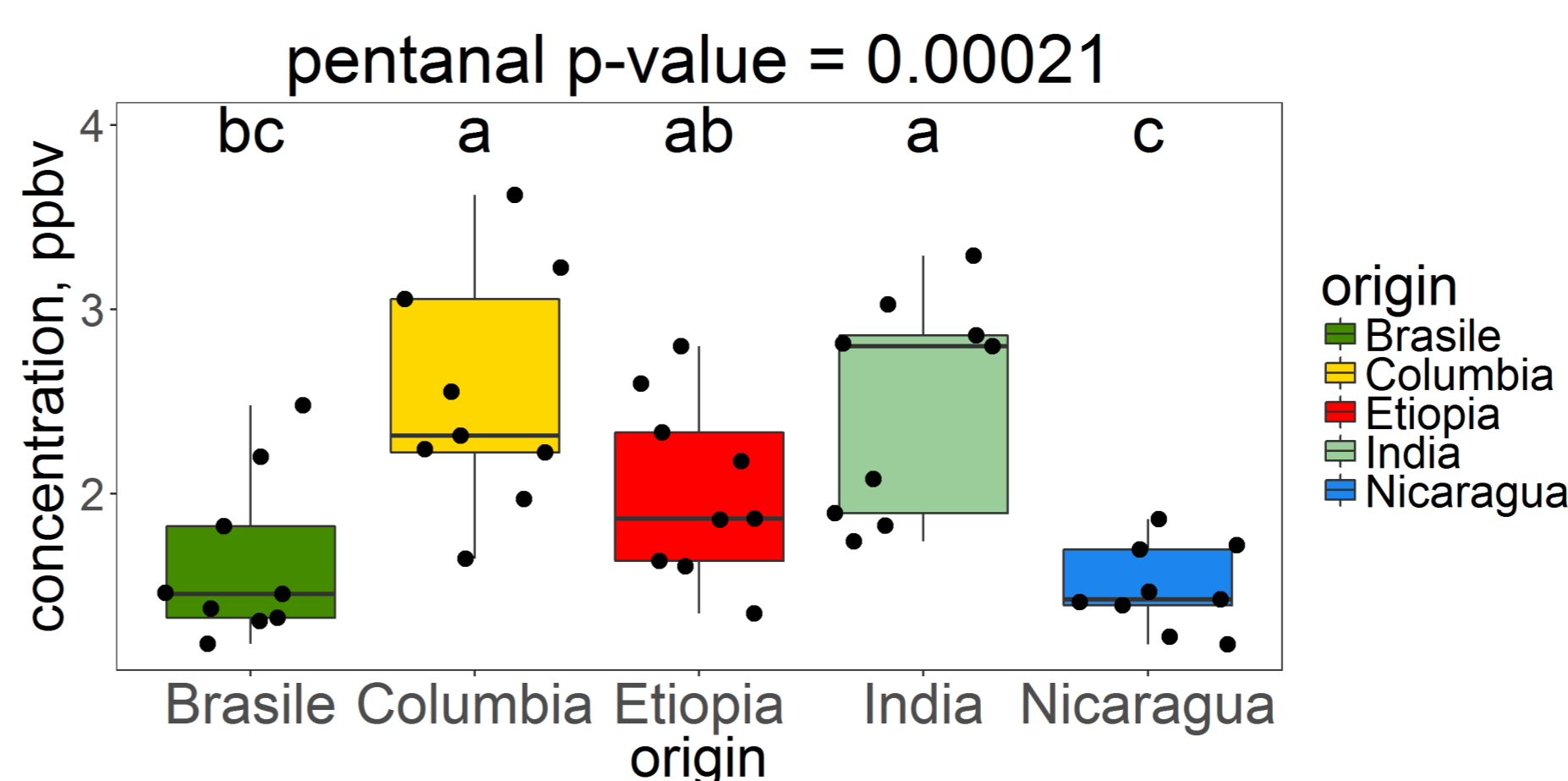
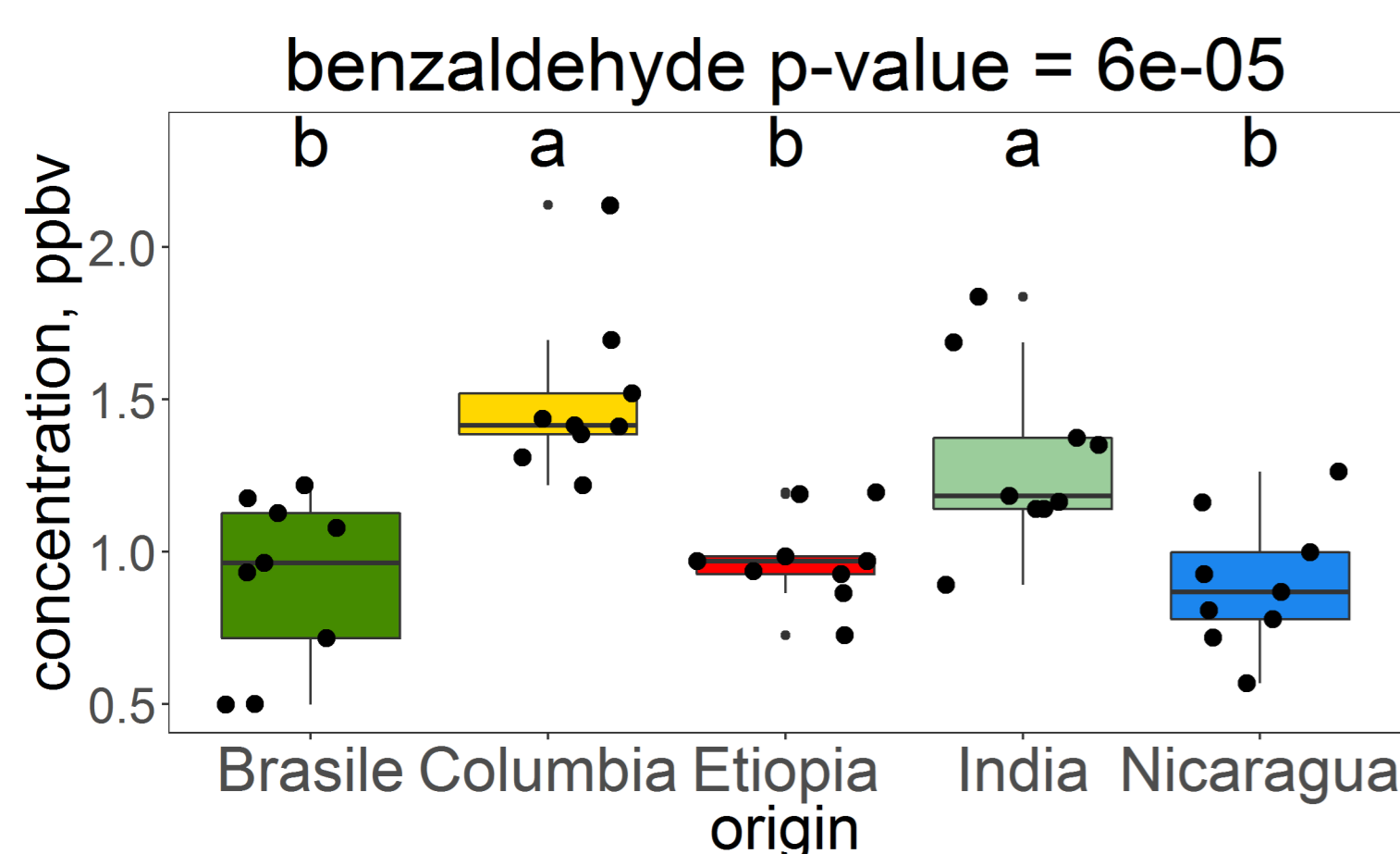
Instrument: *SIFT-MS* (SYFT VOICE200 ultra, Syft Ltd, New Zealand) coupled to a multipurpose *GC automatic sampler* (Gerstel, Germany)

Matrix: coffee beans of **5 geographical origins** and **3 batches** each

Method: **5 green coffee beans** were placed in a **22 mL glass vial**, incubated at **37°C** for **30 min**, and measured for **1 min**



Twenty one *aldehydes*, two *alcohols*, and two *methoxyppyrazines* were monitored in green beans along with a unspecific *monoterpenes* peak. In green beans origin was characterized by the *significant differences* in the concentrations of *five aldehydes* such as benzaldehyde, hexanal, 2-methyl-2-propanal, 2-methylbutanal, and pentanal.



Two selected compounds emitted by green coffee beans of different origins. Labels depict statistically significant differences (Kruskal-Wallis one-way ANOVA, p<0.001)



Instrument: *SIFT-MS* (SYFT VOICE200 ultra, Syft Ltd, New Zealand) coupled to a *oven* (Binder, Germany)

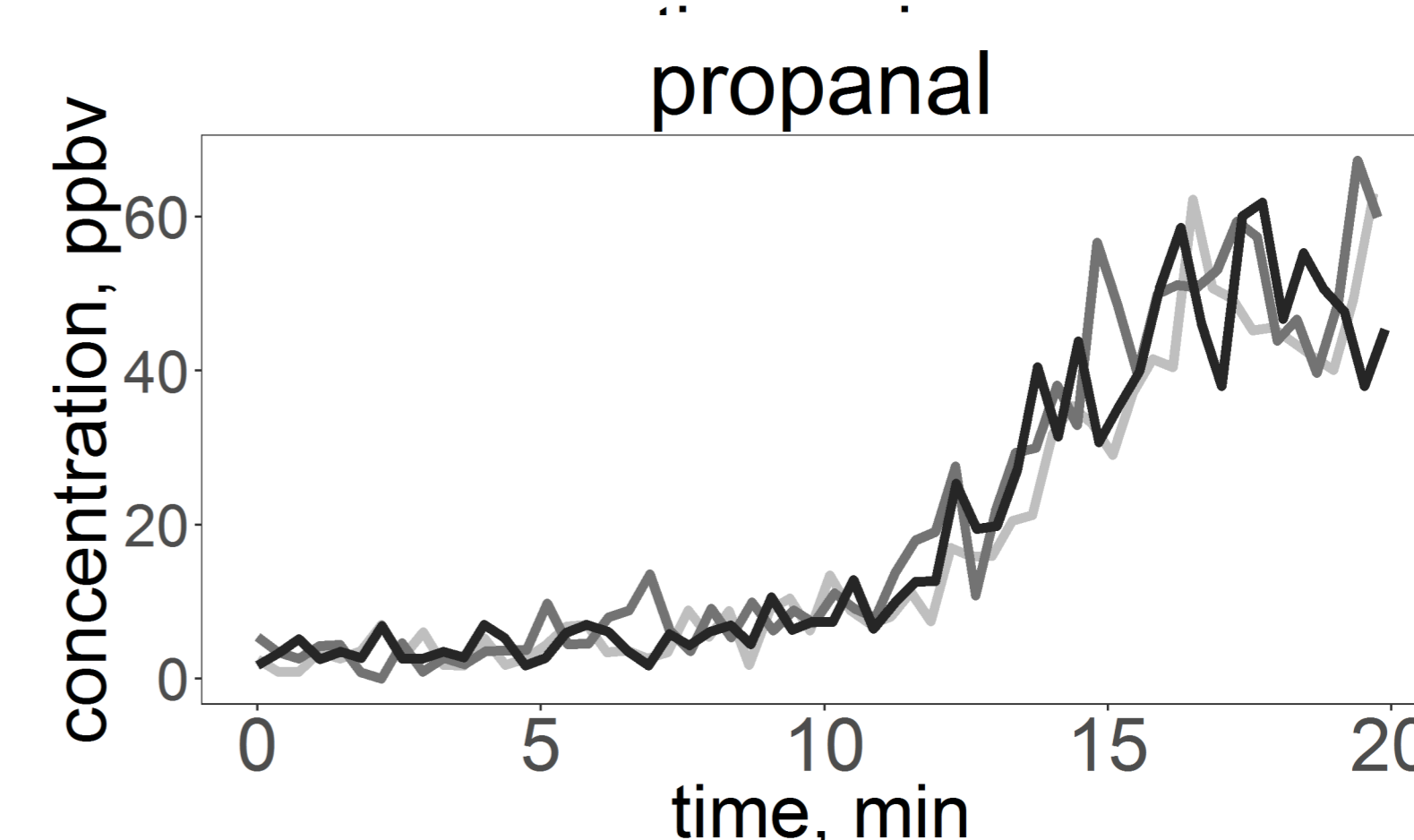
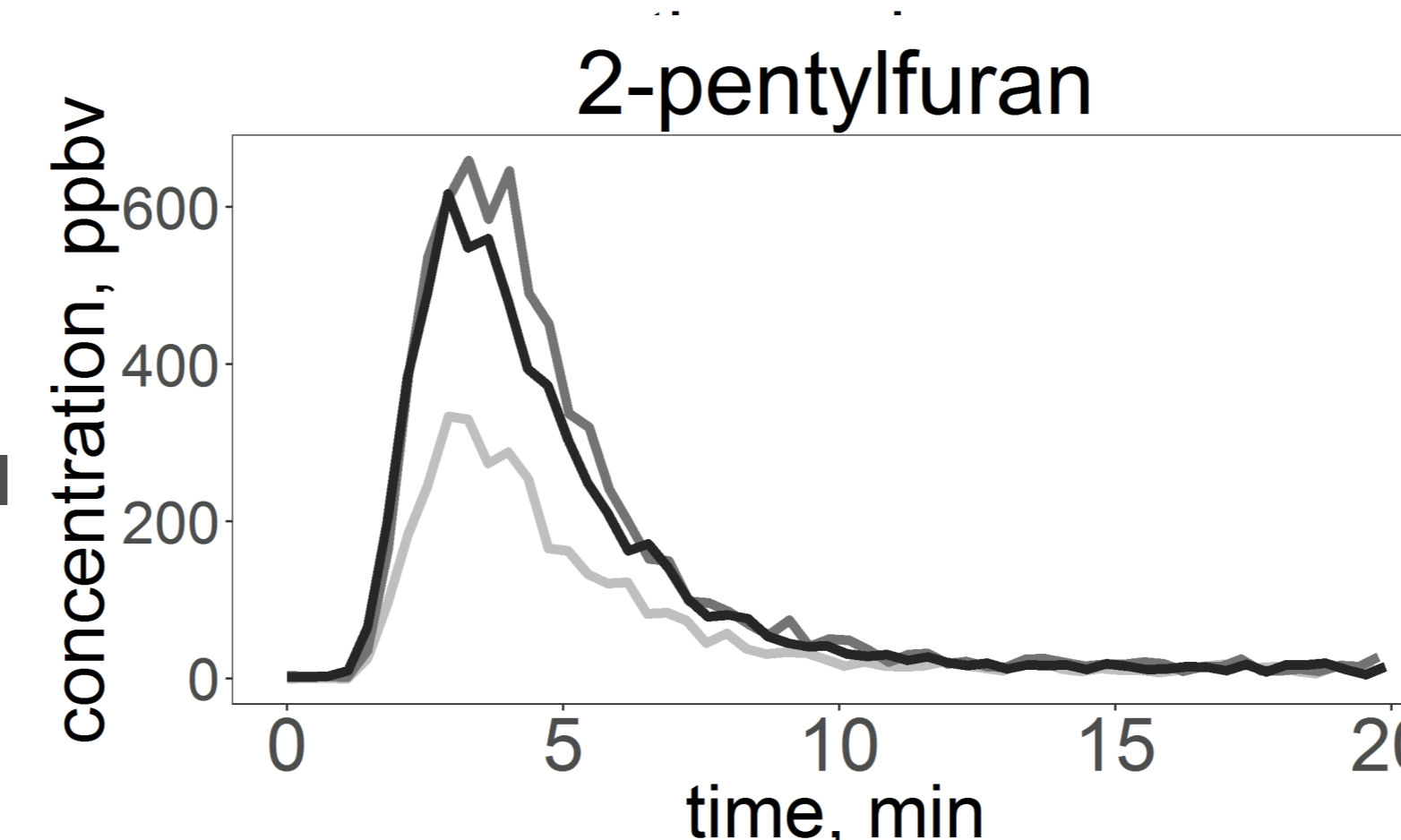
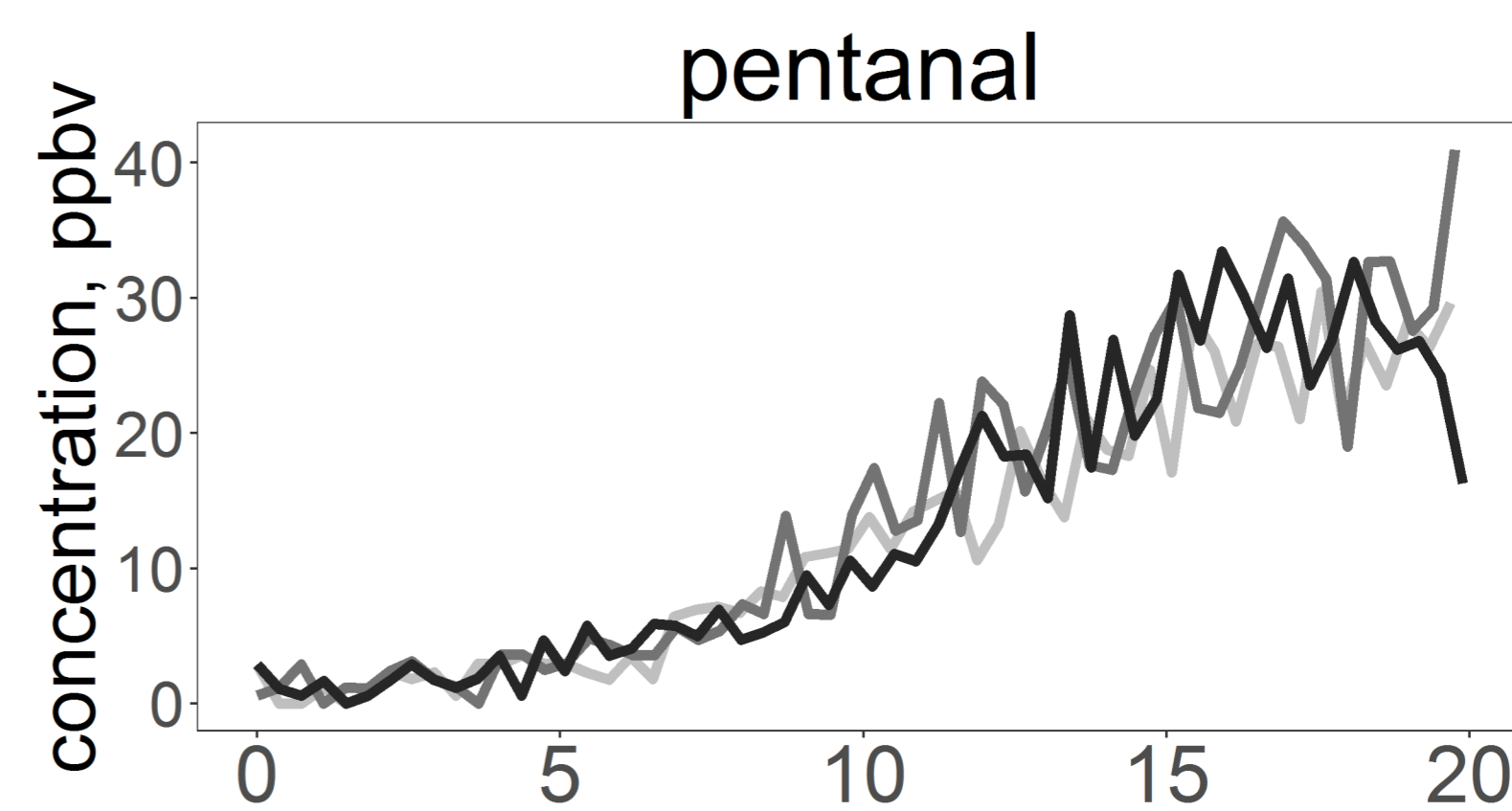
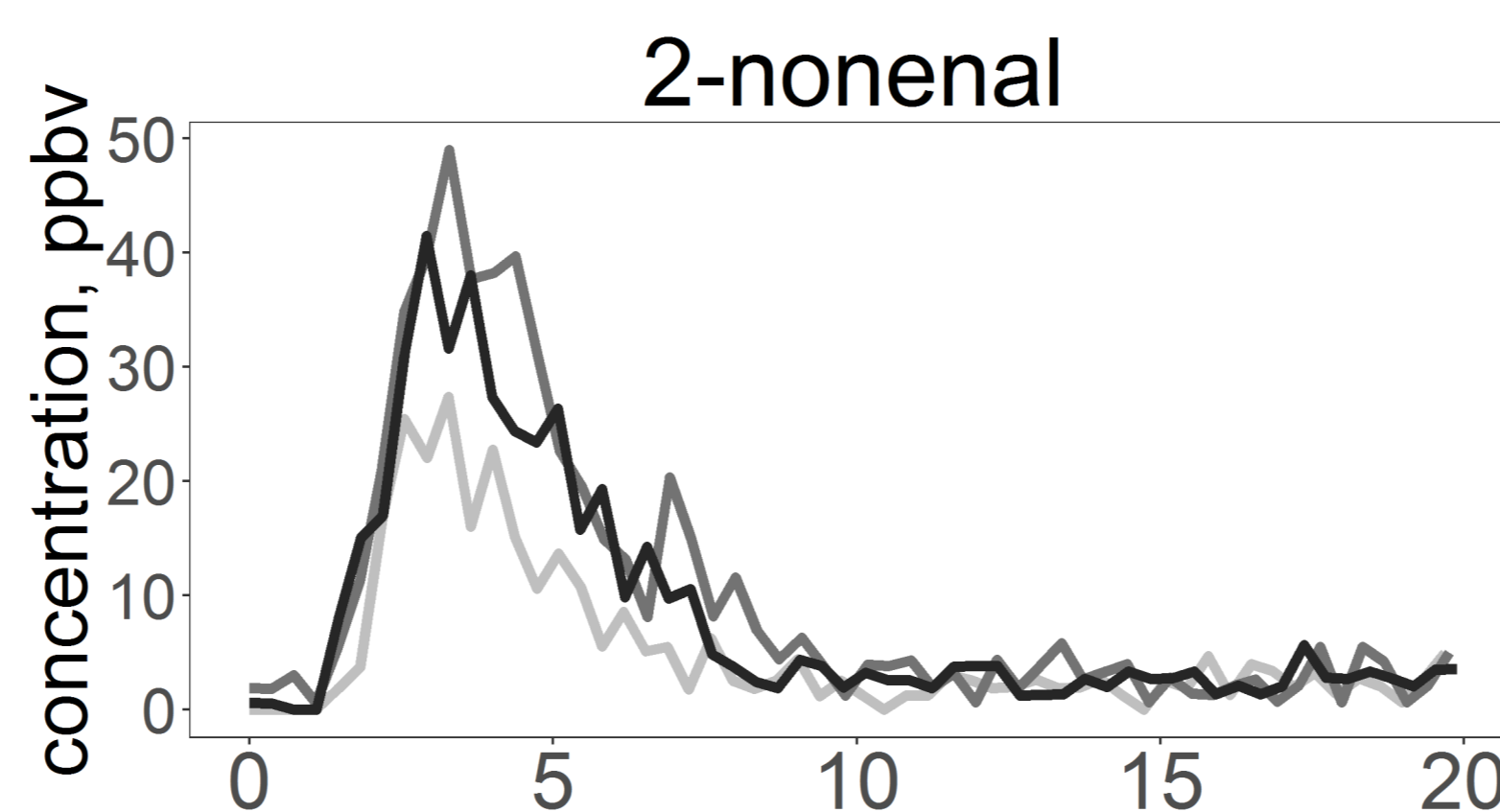
Matrix: coffee beans of **5 geographical origins** and **3 batches** each

Method: **Single green coffee beans** were placed in a **22 mL glass vial**, and roasted in the oven at **211°C** for **20 min**. SIFT-MS monitored roasting through the oven ventilation



During *roasting* two types of *evolution curve* of VOC emissions were observed:

- 1) the **peak** of emission at the **beginning** (2-nonenal, benzaldehyde, and 2-pentylfuran)
- 2) at the **end of the roasting** (hexanal, 2-hexenal, and others).



The concentration of *aldehydes* in *roasted beans* was significantly different from green ones but *no significant* difference according to their *origin* was observed.

The technique was successful applied for screening of green and roasted coffee beans and for online monitoring of the coffee bean roasting. The main differences in aldehyde content in coffee beans were found in green beans rather than in roasted ones.