

What Volatile Compounds Contribute to the Flavour of Sorghum, Cassava and Cowpea Flatbreads?

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Abstract

The heavy reliance of sub-Saharan Africa (SSA) on wheat imports, coupled with the negative impact of the Russia-Ukraine crisis on wheat prices in SSA enhanced interest in the use of sorghum, cassava and cowpeas as ingredients in bakery products. Bread made with these ingredients smell and taste different compared to wheat bread. The aroma compounds characterising sorghum, cassava and cowpea bread products are unknown. This study used the headspace solid-phase microextraction technique (HS-SPME) with a Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS) fibre to extract volatile compounds in flatbreads and then they were analysed using gas chromatography coupled to high-resolution time-of-flight mass spectrometry (GC-HRTOF-MS). Composite flours were prepared from 30 % cowpea flour with 35 % and/or 70 % cassava starch and/or sorghum flour. The effect of compositing sorghum, cassava starch and cowpea on the aroma compounds and aroma and flavour attributes of flatbreads (using a trained sensory panel), was studied. Refined wheat flour flatbread was used as the reference product. Sorghum flour in the composite had a diluting effect on the generation of aldehydes whereas cassava starch presented a high level of acetic acid and aldehydes in flatbreads. These contributed to a greener, fermented aroma and flavour in cassava-cowpea flatbreads. 2-methoxyphenol and 2-methoxy-4-vinylphenol related to the sorghum aroma in flatbreads. Several compounds such as hexanal, 1-octen-3-ol, nonanal dimethyl trisulfide, 2-pentylfuran, 1-(2-furanyl)-2-butanone and heptanal contributed the beany character in the composite flour flatbreads. Cassava-dehulled red and/or white cowpea flatbreads were most similar to wheat flatbreads. This is possibly due to them having a lower number of different aroma compounds compared to the flatbreads with sorghum added or whole cowpea. Moreover, the cassava-dehulled red cowpea flatbread had comparatively less acids, whereas cassava-dehulled white cowpea flatbread contained the most 1-hexanol, a compound higher in wheat. Compositing a blander cassava starch with dehulled cowpea flours with reduced beany aroma compounds may be more beneficial. Information from this study is useful for product developers seeking to utilise sorghum, cassava and cowpea flours in bread products.