

IMPROVING THE FLAVOUR OF STRAWBERRIES ON A NATURAL WAY SENSORY AND INSTRUMENTAL-ANALYTICAL INVESTIGATIONS

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Strawberries belong to the most important crops in the high value region. One major problem in strawberry cultivation is the high sensitivity of the fruit to external influences and the high risk of spoilage within a few days after the harvest. Cultivars that are more stable to spoilage usually lack the typical strawberry flavour.

About 300 volatiles have been identified in the flavour of strawberries. Nonetheless, only a limited number of compounds have been made responsible for the formation of the typical, very pleasant flavour (1, 2). Special emphasis has to be put on two furanoid compounds 2,3-dimethyl-4-hydroxy-3(2H)-furanone (furanol[®], DMHF) and 2,5-dimethyl-4-methoxy-3(2H)-furanone (mesifurane, DMMF). DMHF is considered to be one of the most important contributors to strawberry flavour. The biosynthesis of DMHF by strawberries as well as by microorganisms has been investigated within the last decade. Meanwhile, it seems to be clear that methylotrophic bacteria in symbiosis with the strawberry cells are responsible for the biosynthesis of the furanoid compounds (3, 4).

In order to enhance the flavour quality of strawberries on a natural way we applied two pre-selected and ubiquitously appearing *Methylobacterium ssp.* on strawberries in a field study. To determine the effects of the application of *Methylobacterium ssp.* on the flavour of the strawberries in comparison to control samples, sensory analysis as well as instrumental techniques were used.

For the sensory analysis a panel of 14 members was specifically trained on the strawberry flavour topic over a period of six months. The panelists were trained to describe and recognise those compounds, which are described to be important for strawberry flavour. The compounds were served as such as well as in the strawberry matrix. For the sensory evaluation of the samples from the field study, 3-alternative forced choice tests of all possible sample combinations as well as descriptive analyses were applied.

For the quantitative determination of the flavour compounds gas chromatographic techniques were used. Special emphasis was put on the determination of DMHF and DMMF. In addition, the flavour profile of the strawberries was analysed by GC-MS after headspace solid phase microextraction of the volatiles.

Based on the results from this field study together with biomolecular studies of the used strains, strategies will be mapped out to optimize the application of the strains to enhance the flavour of strawberries on a natural way.

References:

- (1) Schieberle P, Hofmann T (1997) Evaluation of the character impact odorants in fresh strawberry juice by quantitative measurements and sensory studies on model mixtures. *J Agric. Food Chem.* **45**, 277-232.
- (2) Larsen M, Poll L, Olsen CE (1992) Evaluation of the aroma composition of some strawberry (*Fragaria ananassa* Duch) cultivars by use of odour threshold values. *ZLUF* **195** (6), 536-539.
- (3) Kyriacou A, Zabetakis I (2005) The biosynthesis of furanones in strawberry: are the plant cells all alone? in Spanier AM, Shahidi F, Parliament TH, Mussinan C, Ho CT, Tratras Contis E (eds.) *Food Flavor and Chemistry – Explorations into the 21st Century*, The Royal Society of Chemistry, ISBN 0-85404-653-4, 219.223.
- (4) Koutsompogeras P, Kyriacou A, Zabetakis I (2007) The formation of 2,5-dimethyl-4-hydroxy-2H-furan-3-one by cell-free extracts of *Methylobacterium extorquens* and strawberry (*Fragaria x ananassa* cv. Elsanta). *Food Chem.* **104**, 1654-1661.

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