

## Vortrag

### **Innovative quality and safety measures to enable the detection of microbial spoilage throughout the fruit juice production process**

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Lactic acid bacteria (LAB) are ubiquitous in agricultural products like fruit and cereals. They are used for the production of fermented products but also increasingly reported as promoters of food spoilage, affecting the fruit juice industry and leading to huge financial losses. The presence of LAB often remains unnoticed until several days after the onset of activity, which allows the bacteria to spread and infect huge volumes of juice and parts of the production line. When detected, the organoleptic properties of the juice do not permit a further use for human consumption. The collective research project QUALI-JUICE aims to develop an easy-to-use biosensing system to provide early warning of the activity of LAB that will permit juicers to conduct effective on-line quality control. This will allow users to identify shortcomings throughout juice production processes – and enabling countermeasures to be taken before spoilage occurs.

For this, the project, currently on its second year, makes use of L-lactate enzyme biosensor technology. This technology enables the determination of changes in the microbial activity by direct measurement of the microbiological fermentation product. The idea involves building up this on-line early warning system using existing biosensors for the detection of lactate as the major product of metabolism of the LABs.

During the project, existing biosensors used in the biotechnology and food industry for the detection of lactate are being tested, selected, optimised and applied in combination with systems allowing analysis directly at the processing or storage tank, by automated sampling systems, or via hand-held devices suitable for small juice production lines and/or companies lacking automated process control facilities. The QUALI-JUICE prototype will operate with the adequate software which will give a signal in case of increasing lactate concentration at the very beginning of the juice spoilage. That is, the system will be able to detect the kinetics of lactic acid production. This variant is suitable for the on-line analysis of lactate in juice production and will be coupled with the process control scheme of the production line of the bigger companies. The multidisciplinary cooperation of the partners allows the testing of the biosensors to be performed not only under laboratory conditions but also within the installations of the juice production line, making it possible to identify the needs of juice producers and subsequent improvement of the system. Early estimations of the QUALI-JUICE consortium (constituted by a range of juice producers, food institutes and universities) estimated that with the use of this system the production costs could be reduced at least by 3%, by the decrease of juice spoilage events by at least 80%.

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