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EDEN: aquaponics-based sustainable food production

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Efficient, and sustainable food production (FP) systems are essential towards achieving circular economy and society. The rapid population growth, climate change and supply chain disruptions are some of the major FP challenges. Decentralized vertical farming (DVF) can address such challenges by enabling resource efficiency and productivity of FP in controlled environments.
EDEN research project aims to develop a DVF system in combination with efficient energy, resource and distribution cycles as a new, disruptive concept for achieving a circular FP. A stand-alone IoT-based system will be designed for system measurement and control. Additionally, a knowledge management tool will be developed to efficiently and continuously exchange yield and operations-related information in the system.
Finally, to enable product traceability and efficient information exchange in the food supply chain, a distributed ledger-based digital framework will be developed for tracking food and communicating the evidence of food quality and sustainability to consumers.
EDEN recently started and is implemented by five partners: STPUAS, Research Studios Austria, Austrian Institute of Technology, BEIA and AndersFarm. It aims to improve the circularity of an aquaponic system and to make developed concepts accessible and transferrable to other food manufacturers. The initial project insights will be presented at the conference.

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Optimization of the Measurement Parameters of the Electronic Tongue for the Classification of Different Fat Content Trappist Cheese

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Cheese flavor highly depends on both its volatile and nonvolatile compounds such as peptides, amino acids, fats and salts. The characteristics of the end-product depends on the quality of the milk and the ripening method affecting the microbiological, organoleptic and physical-chemical properties. E-tongue providing simultaneous multi-component quantitative determination along with qualitative discriminatory capacities is considered to be a good alternative to classical laboratory techniques because of its high sensitivity, low cost, simple operation, and inherent portability. The efficiency of e-tongue can however be limited by the solutions' concentration and the sequence order defined by the method, both influencing the selectivity and sensitivity of the sensors array. Our purpose was to determine the optimal parameters of the e-tongue measurements to improve the performance of the method for discrimination of cheese.
Five different brands of Trappist cheese were evaluated. The samples were mixed with distilled water in three different concentrations (1, 5 and 10 w/v%) in three replicates each and tested in three different measurement order. Data was evaluated with Principal Component Analysis and Linear Discriminant Analysis, for classification by brand and fat content (L=low and H=high).
The results showed a better capability of e-tongue to discriminate between samples over higher concentrations, with recognition and prediction accuracies in the range between 92.50% and 97.52% and between 82.53% and 95.04%, respectively. When assessing the effect of the sequence, e-tongue performed better when (L, L, H, H, H) sequence was adopted, further highlighting the matrix impact.