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Food without fields -plant cell technology for a sustainable food supply

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Despite enormous intensification, food production methods have basically not changed for hundreds of years. Plants are farmed in fields, harvested at the end of the season and transported to factories for further processing or straight to the markets or grocery stores where consumers buy them. Alternative approaches are desperately needed due to the huge challenges ahead. The global population will need 60% more food by 2050 but global warming and exhaustion of the soil will render agriculture more difficult in many current agricultural areas. At the same time, the production of materials and energy will compete with food production for land use. Agriculture accounts for 20–25% of all global greenhouse gas emissions and relies on chemical fertilizers from fossil resources, and harmful agrochemicals. Urbanization drives food production into cities in order to reduce transport costs and waste. There is a need to produce larger quantities of healthier food, with less resources and land, closer to urban consumers. Plant cell cultures (PCCs) are totipotent and cultures of almost any species can be grown in bioreactors instead of fields, enabling contained and fully controlled year-round biotechnological production. PCCs are used for the commercial production of phytochemicals for pharmaceuticals, pigments, cosmetics and additives. The biomass is usually extracted for single components, but the value of the whole material as food has been neglected. PCCs contain nutritionally promising combinations of proteins, carbohydrates and lipids, enriched with vitamins and health-promoting compounds. Additionally, they exhibit technological process ability relevant for the food industry as well as suitable sensory qualities. The presentation aims at highlighting the great potential of PCCs for a sustainable, secure and healthy food supply and the state-of-art in research and development.

Biography

Heiko Rischer is heading the VTT Plant Biotechnology team and teaches as Docent of Pharmaceutical Biology at the University of Helsinki, Finland. His expertise is in Plant Biotechnology covering plant cell and tissue culture techniques including industrial upscaling in bioreactors, plant metabolism and metabolic engineering. In various functions, he has been involved in interdisciplinary projects either as Scientist or Manager. He has supervised students at all career levels and has authored more than 60 peer-reviewed scientific articles.

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