

Plant cell agriculture: a highly controlled and standardized *in vitro* system to develop new plant-derived foods

S. Massa^{1*}, M. Nocenzi², O. Presenti¹, G. P. Leone¹, R. Tavazza¹, R. Pagliarello¹, A. Calderamo², E. Bennici¹ and V. Mastrobuono^{1,3}

¹*ENEA, Italian National Agency for New Technologies, Energy and Sustainable Economic Development. Biotechnology and Agro-Industry Division, Casaccia Research Center, Rome, Italy*

²*Sapienza Università di Roma, Dipartimento di Comunicazione e Ricerca sociale, Rome, Italy*

³*University of Tuscia, DAFNE – Department of Agriculture and Forest Sciences, Viterbo, Italy*

Plants are a source of healthy nutritional principles. Nevertheless, it will be increasingly difficult to provide plant-derived food of good quality in the future, since food security prospects are affected by the impact of climate change on plant health/productivity with effects on the whole agri-food sector. In addition, the prospect of increasing the arable area is insufficient (2%) and intensive agriculture is already an environmental burden, being responsible for about 20% of global emissions and involving the use of pesticides. In this scenario, our approach is rather to search for new supply systems of plant-derived raw materials with the aim to guarantee nutrition, health and safety.

Cellular agriculture, is being developed to decrease the dependence of plant agri-food production of valuable plant species on productivity variations due to climate change, for continuum, programmable and flexible productions allowing the intake of value-added molecules exactly in the state in which they are present in nature (phytochemical) with the diet. In analogy to the radical invention of "cultured meat", but to an even greater extent, bioreactor-grown Plant Cell Cultures could be exploited as an entirely new food biomass for human consumption. Thanks to the totipotency of plant tissues, it is possible to isolate single plant cells from plant tissues (i.e., as an example, BERRIES) and to culture these cells in bioreactors in the lab, strictly controlling their growth, properties and safety aspects. This approach moves the paradigm of agricultural production from the plant itself cultured in an endangered nature to the lab.

Plant cell cultures with nutritional and functional value were set-up and we are proceeding with the evaluation of technical solutions to pre-industrialize prototype food products. A sociological investigation is being performed to understand factors of choice for possible future innovative foods containing plant cells. A scenario emerges within which individuals are called upon to make consumption choices that are often forced between personal and collective needs in conditions in which information or knowledge may not be fully accessible, leaving them unaware of the risks and opportunities they face; their ability to adapt to the transformations taking place may be limited by economic, cultural, hence collective, but also personal capacities.

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* E-mail: silvia.massa@enea.it