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Poster Abstract – 1.12

TOMATO IONOMIC APPROACH FOR FOOD FORTIFICATION AND SAFETY

DE BIASI M.G.*, SALLUZZO A.**, LIPPO S.M.*, PALOMBA F.*, RUOTOLO G.*, CHIAIESE P.*, FILIPPONE E.*

*) University of Naples "Federico II", School of Biotechnology, Department of Soil, Plant, Environmental and Animal Production Sciences, Via Università 100, 80055 Portici (NA), Italy
**) ENEA Italian national Agency for New Technologies, Energy and the Environment, Portici - Research Centre, Via Vecchio Macello, 80055 Portici (NA), Italy

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Food fortification is an issue of paramount of importance for people living both in developed and in developing countries. Among substances listed as "nutriceuticals", essential minerals have been recognised for their involvement in several healthy issues, involving all ages. In this frame, food plants are playing a pivotal role since their capability to compartmentalise ions and protein-metal complexes in edible organs. Conversely, the accumulation of high metal levels in those organs may lead to safety problems. In the recent years, thanks to the availability of new and improved analytical apparatus in both ionic and genomic/transcrittomics areas, it is became feasible to couple data coming from plant physiology and genetics. Ionomics is the discipline that studies the cross-analysis of both data sets. Our group, in the frame of GenoPom project granted by MiUR, is interested to study the ionomics of tomatoes cultivars derived by breeding programmes in which wild relatives have been used to transfer several useful traits, such as resistance to biotic or abiotic stresses, fruit composition and textiture, etc. The introgression of the wild genome into the cultivated one produces new gene combinations. They might lead to the expression of some traits, such as increased or reduced adsorption of some metals and their exclusion or loading into edible organs, thus strongly involving the nutritional food value. Our final goal is to put together data coming from ions homeostasis and gene expression analyses, thus obtaining an ionomic tomato map related to ions absorption, translocation and accumulation in various plant organs, fruits included. To follow our hypothesis, we are studying the ionome of *Solanum lycopersicum* cv. M82 along with 76 Introgression Lines (ILs) produced by interspecific crosses between this cultivar and the wild species *S. pennellii*. These ILs are homozygous for small portions of the wild species genome introgressed into the domesticated M82 one. They are used as a useful tool for mapping QTL associated with many traits of interest. It is worthy to note that, until now, little information is available on QTL for ions accumulation in tomato. Moreover, as our knowledge, effects of new gene combinations in introgressed lines on ions uptake related to food safety have not been extensively studied. In this presentation we show results coming from the ionome analysis, carried out on *S . lycopersicum* M82 and several ILs. Plants were grown in pots in a greenhouse and watered with deionised water Thirty day-old plants were left to grow for 15 days in the presence of non-toxic concentration of Cd, Pb, As, Cr and Zn given combined. Leaves of all plants were then harvested and stored at -80°C for ionome and gene expression analyses. Preliminary results of ionome analysis of *S. lycopersicum* M82 and several ILs, carried out using an ICP-MS, showed that traits correlated to toxic metals and micronutrients accumulation in apical leaves were significantly

modified in response to specific genetic backgrounds. Those results are perhaps due to the introgression of traits linked to uptake, translocation and accumulation of useful and/or toxic metal into plant apical leaves and to interactions of the wild type introgressed genomic regions with the cultivated genome. Also, data are shown on the identification and isolation of *Solanum* gene sequences related to ions uptake, translocation and accumulation, useful for further real-time gene expression evaluation in both cultivated and ILs during the treatments with the above-mentioned metals.