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Poster Abstract – B.15

COMPLEX NETWORK ANALYSIS OF TRAITS AFFECTING TOMATO ORGANOLEPTIC QUALITY

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Considerable research has been directed towards improving the flavour of tomato as the consumers are becoming more demanding regards fruits quality and the organoleptic characteristic. The long term objective of tomato breeding programmers is, therefore, to assess metabolites that contribute to define the targets flavour and to design strategies for improving them. Flavour is a very complex trait that is affected by many genetic components and non-genetic factors, not all of which are known or well understood. Assessing metabolites that contribute to define the target flavour and designing strategies to improve it is a long-term objective of tomato breeding programmes. The development of high-throughput data-collection techniques allows the simultaneous analysis of several metabolites and helps to determine how and when these molecules interact with each other. In the present work a network analysis was performed based on metabolic phenotypic and sensory date to evidence important relationships between these traits.

Network analysis has proved to be a powerful tool to distil data meaning. Biological networks as abstract representations of biological systems have captured many of their essential characteristics and interactions. In the network, the traits are represented by nodes that are connected by links, with each link representing the interactions between two components. In particular we performed tomato metabolite profiling in parallel with a plant phenotype characterization and fruit sensory analysis on 8 traditional Italian tomato ecotypes harvested in two different growing sites. The network consisted of 35 nodes and 74 links corresponding to the 74 significant (positive or negative) correlations among the variables studied. Various types of interactions, including amino acid networks, phenotypic and metabolic associations with sensory attributes and links among metabolites of organoleptic importance were revealed and essential relationship were visualized. The main feature of the network was the presence of three nodes interconnected between themselves (dry matter, pH and °Brix) and with other traits, and nodes with widely different link degrees. The identification of strong associations of metabolic traits with important sensory traits, as acidity with overall aroma, Gly with tomato smell, granulosity with dry matter will address future more focused investigations.