Proceedings of the LXVI SIGA Annual Congress
Bari, 5/8 September, 2023
ISBN: **978-88-944843-4-2**

Poster Communication Abstract – 7.20

INVESTIGATING THE ROLE OF AN ERF TRANSCRIPTION FACTOR IN MEDIATING STRESS RESPONSE AND TOMATO FRUIT RIPENING AND QUALITY

PANE M.*, CASTALDO C.*, GENTILE D.*, MOLISSO M.*, GIANOGLIO S.***, COMINO C.**, MOGLIA A.**, ERCOLANO M. R.*, DI MATTEO A.*

*) DiA, Department of Agricultural Sciences, University of Naples Federico II, Portici (NA), Italy
**) DISAFA, Department of Agricultural, Forest and Food Sciences, University of Torino, Grugliasco (TO), Italy
***) Instituto De Biología Molecular y Celular De Plantas (IBMCP) CSIC-UPV, Ingeniero Fausto Elio/n, 46022 Valencia, Spain

Solanum lycopersicum, genome editing, CRISPR/Cas9, ethylene responsive factors, fruit antioxidants

Tomato (*Solanum lycopersicum* L.) is one of the world's most consumed vegetables and its consumption has been associated with decreased risk of chronic degenerative diseases. Tomato fruit is an important source of antioxidant compounds such as carotenoids, particularly lycopene, ascorbic acid, vitamin E and phenolic compounds.

Fruit ripening is regulated by ethylene. Ethylene biosynthesis and signaling are modulated during fruit development and ripening and are involved in several processes such as antioxidant accumulation and softening that affect fruit quality and shelf-life. To date, several strategies have been implemented in tomato to modulate ripening and enhance tomato fruit quality and shelf-life by regulating the expression of genes involved in ethylene biosynthesis, perception or signaling.

Among others, AP2/ERF genes are transcription factors which play key roles in several processes, such as plant development, ethylene response, and pathogen resistance. In tomato fruit, they can act as positive or negative regulator of ripening and of ethylene production.

Our goal is to elucidate the functional role of ERF F4 gene (Solyc07g053740) in mediating modulation of the tomato fruit ripening

during the plant response to abiotic stress and investigatiing its impact on fruit redox balance and antioxidant accumulation. In particular, the ERF F4 locus was targeted in Microtom by CRISPR/Cas 9 technology to generate knockout tomato plants. One month-old T3 offspring mutant and wild-type plants underwent three level of irrigation, consisting in the complete restitution of water (FWR), restitution of 50% of lost water (HWR) and 30% of water restitution (TWR), respectively.

Beside no variation was observed in the lycopene and total carotenoid levels in fruit at the red-ripe stage, edited plants showed increased levels of soluble solid content than wild type plants and responded to drought treatment with a higher increase in their antioxidant capacity.

These results suggested the involvement of ERF F4 in modulating ripening-associated metabolic processes and fruit redox balance in response to abiotic stresses.

Ongoing experiments will further investigate the role of the tomato ERF F4 in regulating the expression of genes involved in controlling the metabolism of antioxidants, particularly glutathione and ascorbate pool.