

## **EPIGENETICS: A NOVEL BIOTECH APPROACH WHICH COULD ENHANCE TOMATO BREEDING INSIGHT ON QUALITY AND FLAVOR**

CARUSO S.\*, ICHIKAWA M.\*\*, DI MARTINO M.\*, BOCCHINI M.\*\*\*, MARCONI G.\*\*\*, ALBERTINI E.\*\*\*

\*) United Genetics Italia S.p.A

\*\*) Kagome CO., LTD

\*\*\*) Dipartimento di Scienze Agrarie, Alimentari e Ambientali, Università degli Studi di Perugia

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With a total production of 182 million tons, Tomato is the highest-value fruit and vegetable crop worldwide, counting for more than \$ 60 billion in 2017. Although the modern approach of breeding researches for *Solanum Lycopersicon* L. aimed at implementing yield, firmness, long shelf-life and resistance to diseases, tomato market is actually fighting a lack of flavors and organoleptic variety features. Indirectly, customers and retailers are switching their choices for the main varieties with the best combination between taste and life-span; on the other hand, farmers push the breeder to genetically maintain both agronomic standard and quantitative traits. Deep in this scenario, tomato fruit development consists in a complex process regulated by plant hormones and transcription factors, requiring epigenetic modifications as methylation. Promoter-methylated genes are preferentially expressed in a tissue-specific manner.

This work aims at elucidating the mechanisms behind fruit flavor by investigating both the epigenetic and transcriptomic landscape in different tomato hybrids. In particular, the study design includes three size types of commercial tomatoes, i.e., mini plum, round and oxheart, representative of our pipeline for flavor and organoleptic characteristics. A spring trial in Fondi (Latina, Italy) were conducted, including both parental lines and hybrids for a total of 27 genotypes (9 genotypes per 3 replicates).

At mature stage, fruits were collected to isolate DNA and RNA that were used for MCSeEd and RNAseq approaches. Moreover, fruit phenotyping was

performed to track data on color, firmness, brix, acidity and other osmotic compounds. Preliminary data suggest a heterogeneity for instrumental features as weight, caliber, color and firmness. Moreover, in our results, fruit size is not always negatively linked to brix, as round and oxheart hybrids and parental lines showed both large size and high refractometric index.