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Abstract – SY20

MODIFICATION OF THE PEACH TREE ARCHITECTURE USING GENOME-EDITING APPROACH ON THE *PpeTAC1* GENE

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In the twentieth century the progressive growth of the world population, the greater demand for food, the need to increase production and the emerging climate changes focused the attention on agricultural practices looking for more sustainable strategies. One of the most important challenges that humanity is called to face is the improvement of the production reducing inputs as water, fertilization, pest management and land usage. To achieve this goal, the increase of crop yields or/and of the number of plants per hectare is pivotal. In peach (*Prunus persica* L.), the columnar (or Pillar) phenotype br/br, characterized by narrow branches and reduced canopy diameter which potentially could boost productivity was described. Different evidences show that narrowed canopy in fruit trees is able to increase crop yields through a more efficient interception of the light and the improvement of dry matter partitioning. The Pillar phenotype in peach is obtained through the gene deletion of *PpeTAC1*, an ortholog of the *Tiller Angle Control 1* (*TAC1*) in rice. This gene drives the growth of horizontal branches in different plant species as rice, maize and *Arabidopsis* therefore its deletion leads to compact *habitus* and vertical branches growth. The availability of the peach genome sequence and the emerging New Breeding Techniques (as CRISPR/Cas9) allow the insertion of desired traits into commercial varieties dramatically reducing time and costs. In the present work two sgRNAs were designed on the *PpeTAC1* with the aim to obtain a deletion of 400 bp and the consequent gene disruption. The guides were cloned into a vector harboring the *hCAS9* cassette and *NptII* marker gene using the GB cloning strategy; the obtained plasmid was used to transform *Agrobacterium tumefaciens* LBA4404. Leaves of two peach cultivars (Independence and Rich Lady) and leaves and *callus* of an almond x peach hybrid (GF677) were transformed. Plant tissues were placed in an appropriate growth medium with the aim to promote regeneration. Different explants are currently under screening for the evaluation of possible editing events.