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Poster Abstract – C.17

TOMATO SESQUITERPENE SYNTHASE SSTLe1-2 AND GCS MEDIATE TRITROPHIC INTERACTIONS

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Plants have developed several strategies to counter the threat of herbivore pests including physic barriers that reduce insect colonization (i.e landing, movement) and metabolite production that negatively affect insect physiology and behaviour (i.e. feeding, oviposition). Moreover, plants interact with the third trophic level represented by pest's predators and parasitoids.These antagonists parasitizing and preying in insect pests, actuate the so called indirect defence, a strategy that may enhance crop protection in an environmentally safe manner. Attractiveness of herbivores' natural enemies are mediated by a complex mixture of metabolites with a high vapour pressure called Volatile Organic Compounds (VOC) produced by herbivore infested plants. In recent years several efforts have been dedicated to study genes belonging to biosynthetic pathway involved in VOC production in several plant species. Plant volatiles, usually, are divided into three major classes: terpenoids, fatty/amino acid derivatives and phenylpropanoids/benzenoids. We focused our attention on tomato genes involved in terpenoids biosynthetic pathway and their regulation after wounding and herbivore *stimuli*.

To this aim we used transgenic tomato plants transformed to constitutively express the tomato prosystemin gene as these plants in the absence of herbivores attacks, accumulate defence proteins similarly as occurs in control plants damaged by *larvae* feeding (McGurl *et al*., PNAS: 1994; 91:9799).The results of the expression analysis, carried out by SYBR-Green Real Time RT-PCR, indicated that herbivory up-regulates genes involved in late steps of terpenoids pathway, such as ***FPS1*** (Farnesyl Pyrophosphate Synthase), ***SSTLe1-2*** and ***GCS*** (Sesquiterpene Pyrophosphate Synthase), while down-regulates ***LeCCD1A*** and ***LeCCD1B*** genes involved in carotenoid catabolism responsible of tomato fruit flavour. These data suggest a role of prosystemin in terpenoids metabolism regulation.

In an attempt to identify the role of ***SSTLe1-2*** *and* and ***GCS*** genes in the indirect defence mechanism through VOC production, we produced transgenic tomato plants in which Sesquiterpene Synthase genes were silenced through PTGS approach, performed by the RNA interference. The volatiles produced by three T1 transgenic lines and relative control cv "Red Setter" were collected and analyzed by Gas Chromatography coupled with Mass Spectometry (GS-MS). The results indicate that tomato silenced plants emitted a modified blend, with lower amount of 4-Ethylbenzaldehyde, 4-Ethylacetophenone, 2,4-Dimetylacetophenone and 1,4-Diacetylbenzene than untransformed control plants. Furthermore we evaluated, through a four-ways olfactometer bioassay, the modified VOC blend which proved to be associated with a lower attractiveness of the female of the parasitoids *Aphidius ervi.*

These data indicate that ***SSTLe1-2*** and ***GCS*** play a key role in the production of VOC associated with the attractiveness of natural enemies of insect pests.