

COMPREHENSIVE DISSECTION OF THE POSTHARVEST DISORDER SUPERFICIAL SCALD IN APPLE THROUGH THE INTERREGIONAL PROJECT NETWORK-EUREGIO SCALD-COLD

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Apples, after harvest, are stored to enable a continuous year-round availability of fresh fruit on the market. The cold temperature applied to slow down the ripening process can also trigger the development of a series of chilling injury disorders, such as superficial scald. The symptoms of this phenomenon are characterized by the development of brown-discolored areas on the fruit skin, compromising, in the end, the fruit marketability. In order to comprehensively dissect the underlying physiological mechanisms and genetic control of superficial scald, a multi-disciplinary approach has been designed and presented within the framework of “Scald-Cold”, an Interregional project Network (IPN) granted by the European Region Tyrol, South Tyrol and Trentino (EGTC). This initiative will be carried out by a consortium involving the Fondazione Edmund Mach, the University of Trento, the Research Centre Laimburg and the University of Innsbruck. During the ongoing of the “Scald-Cold” project, several technologies will be employed towards the elucidation of the genetic and physiological regulatory process taking place during the development of this disorder. A QTLome and Systems Genetics approach will be initially employed to target the genomic regions

involved in the control of several phenotypic entities related to scald. A high-density linkage map and a comprehensive analysis of different metabolites will be integrated to target the QTLs related to the metabolic modification occurring during the development of the superficial scald. A Genetical Genomic investigation will finally identify the complete transcriptome profiling of the population through a TranSeq-3' end sequencing procedure, for the definition of the eQTLs associated to this disorder. To date, few strategies already exist to prevent the development of superficial scald, such as the application of the ethylene competitor 1-methylcyclopropene (1-MCP) and storage at low oxygen concentration. To shed light on the protecting mode of action of these procedures, a genome-wide transcriptome analysis will be carried out to illustrate the effect and mechanism of these postharvest strategies in coordinating a comprehensive metabolic and transcriptome reprogramming towards the scald prevention. In the end, the development of this disorder will be also monitored with innovative non-destructive methods implemented for the definition of predicting tools. The different disciplines representing the core of this project aim to identify new tools important for both the scientific and technical communities interested in apple breeding and postharvest. To this end, the "Scald-Cold" project would discover new molecular markers suitable for the selection of new apple varieties genetically resistant to superficial scald, together with the development of tools for an early detection of this phenomenon and a better understanding about the different postharvest technologies to date employed in apple postharvest.