TRANSCRIPTOMIC ANALYSIS OF TOMATO GENES FOLLOWING INFECTION BY THE GEMINIVIRUS TYLCSV

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Several viruses can affect tomato (Solanum lycopersicon), a model species for the Solanaceae. Among them, geminiviruses cause yellow leaf curling and severe crop losses worldwide, but the molecular mechanisms underlying infection and symptoms development are far to be understood. To elucidate the transcriptional response of plants to Tomato yellow leaf curl virus infection, microarray analyses were performed. Plants were grown under controlled conditions in a growth chamber; viruliferous whitefly vectors (Bemisia tabaci) were caged on a fully expanded leaf, allowed to feed for 24h, and then removed. A young leaf was sampled after 1, 7 and 14 days. Control plants underwent the same treatment, with non-viruliferous whiteflies. In this work, using microarray technology and a set of approximately 12,000 tomato genes represented in the TOM2 oligonucleotide chip (Cornell University, USA), we analysed the genes differentially regulated during TYLCSV infection. Experiments were conducted with three biological replicates for each condition studied, and results were validated by qRT-PCR on selected genes.

At the onset of virus infection (1 day), the plant appeared to respond promptly, with more than 2000 genes regulated (FDR<0.05), including categories such as defense and stress response, primary metabolism, photosynthesis, DNA-protein complex assembly and organization and biogenesis of chromosomes.

This extended perturbation of the transcriptome decreased substantially after 7 and 14 days, when only 123 and 18 genes were regulated. The limited transcriptomic response observed 14 days after inoculation, when the systemic infection is well established, can be the result of a very fine strategy employed by the virus to escape the plant defence system. This strategy includes its strict phloem confinement and its capacity to produce silencing suppressors. In fact, symptoms caused by TYLCSV include leaf curling and yellowing, flower abortion, plant dwarfing, but no signs of hypersensitive reaction, necrosis or cell death, and no plant death.