Transcriptional memory in coffee response to drought

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Harsh environmental conditions can induce different plant stress responses for which a cross-talk may occur. Water deprivation is an important limiting to crop productivity. Modulation of cellular pathways triggered by abscisic acid (ABA) probably involving receptor-like kinases is a crucial step for drought response. The Reactive Oxygen Species also participate in drought response but the toxic increase of their levels induced by the stress must be mitigated to protect cells against oxidative damages. The complex expression regulation of genes involved in plant drought response counts not only on transcription factors (TFs) but also on transcriptional memory. Here, RNA-Seq approach was used to investigate drought responses of *Coffea canephora* clone 109 and 120, respectively sensitive and tolerant to drought. Illumina sequencing allowed us to identify 826 differentially expressed genes (DEG) in the tolerant clone and 135 in the sensitive clone. "Response to ABA" and "heat acclimation" GO categories were exclusively enriched in tolerant clone DEG, respectively after one and three drought cycles. Coffee genes that exhibited altered expression after the first and the third drought exposures were considered memory genes. For tolerant clone, 49 genes exhibited transcriptional memory after multiple drought exposures. Three memory receptor-like kinases probably related to ABA signaling were found to interact with the Cc02_g02350 heat shock protein whose memory profile was confirmed by qPCR. Small RNA profiling (sRNA-Seq) data were analyzed using two different softwares and the miRBase database in order to identify microRNAs in coffee leaves. Conserved regulatory miRNAs and their putative targets were identified, together with putative novel miRNAs. While tolerant plants acclimate to stress, multiple drought exposures seems to induce oxidative stress in the sensitive clone which, in turn, may lead to induction of programmed cell death. Our findings show that transcriptional memory modulates expression of drought-responsive genes and contributes to drought tolerance in *C. canephora.*

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